THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXVI. No. 905.] LONDON, SEPTEMBER 14, 1880. [32ND YEAR. Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
ERITH,
OFFICES:
2, CROSBY SQUARE,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
SEVERAL PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
PROPRIETORS: STEVENS & CO.,
21, GREAT WINCHESTER STREET, LONDON
WORKS: BRIXHAM, TORBAY.

TUBES.
Tubes and Fittings for Gas, Steam, Water, and Hydraulic purposes, plain, galvanized, white enamelled inside, or coated by Dr. Angus Smith's process, or oxidized by Professor Barff's patent process. Gas-fitters tools, brass cocks, &c.
JOHN SPENCER,
VULCAN TUBE WORKS,
WEST BROMWICH, STAFFORDSHIRE,
AND
97, CANNON STREET, LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
MANUFACTURERS OF
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
HEAD LONDON OFFICE:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
LICENSEES AND MANUFACTURERS OF
HUNTS
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETER, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE,
From ½ to 40 H.P. ind.

See Page 406.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

GEORGE GLOVER AND CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS.
GOLD MEDAL. HIGHEST AWARD.

INTERNATIONAL EXHIBITION,
SYDNEY, 1880.
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.
1, LANCASTER AVENUE, MANCHESTER.
Foreign Agents: DAHL BROS., Copenhagen; A. FAAS & CO., Frankfort-on-Maine; W. HOVEN & SON, Rotterdam; COPLAND & M'LAREN, Montreal: A. DEMPSTER, 57, Elizabeth Street, Melbourne.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS,

ROTHERHAM;

AND 85, SOUTHWARK ST., LONDON, S.E.

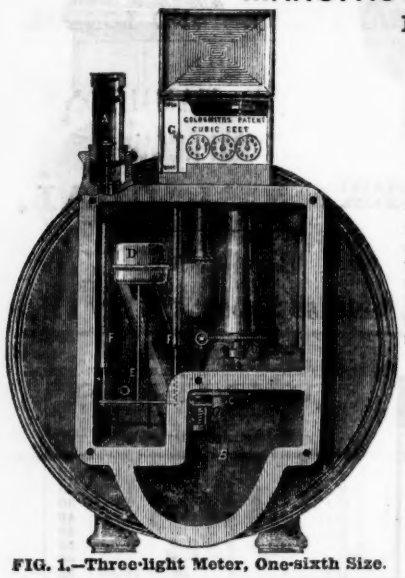


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

FIG. 2.—Three-light Index, Half Size.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

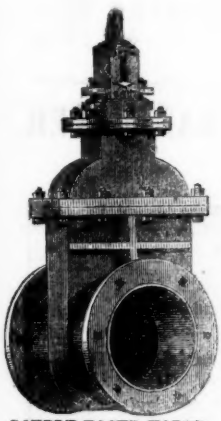
By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

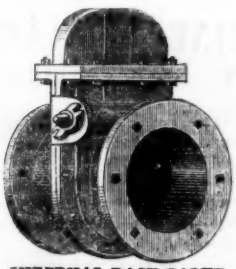
Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES: 97, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

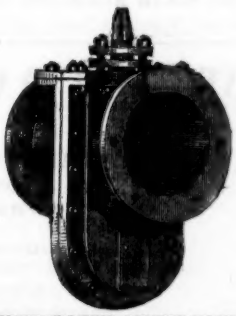
C. & W. WALKERS' GAS-VALVES.



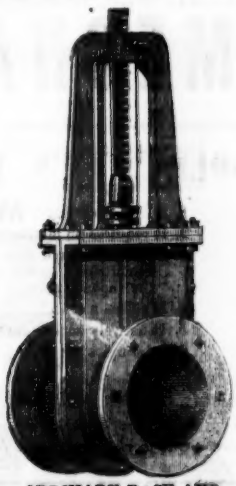
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



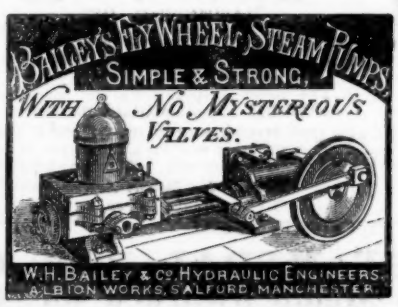
UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.


BAILEY'S FLY WHEEL STEAM PUMPS,
SIMPLE & STRONG,
WITH NO MYSTERIOUS VALVES.
W. H. BAILEY & Co. HYDRAULIC ENGINEERS.
ALBION WORKS, SALFORD, MANCHESTER.

Prices of Bailey's Double-Acting Steam-Pumps.

No.	Diameter of Steam Cylinder.	Diameter of Pump.	Length of Stroke.	Gallons pr. Hour. Approx.	Price.
	Inches.	Inches.	Inches.	At Slow Speed.	£
A 1	4	2	6	850	18
B 2	6	3	10	1,940	25
C 3	6	4	10	2,000	30
D 4	8	4	10	3,150	40
E 5	6	6	10	7,200	40
F 6	8	6	10	7,200	50
G 7	10	6	12	7,200	60
H 8	8	8	10	14,000	65
I 9	10	8	12	14,000	75
K 10	12	8	15	14,000	90
	10	10	15	21,000	110
	12	10	15	21,000	125

NOTE.—*At quick speed these pumps will generally deliver double the quantity specified.*

BAILEY'S HOT-AIR ENGINES,

From ¼-horse to 4-horse Power. Particulars on application. We also make Hot-Air Pumping Engines, and every description of Hydraulic Work.

W. H. BAILEY & CO., ALBION WORKS, SALFORD, MANCHESTER.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

GAS PURIFICATION
BY
OXIDE OF IRON.
GAS PURIFICATION & CHEMICAL Co., LIMITED,
PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.
WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,
For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

MECHANICAL CONDENSATION.

The undersigned has arranged with Messrs. Pelouze and Audouin the exclusive agency for their patented system of Condensation, in Great Britain and the Colonies.

The following are some of the advantages which this philosophic mode of arresting liquefiable vapours possesses:—

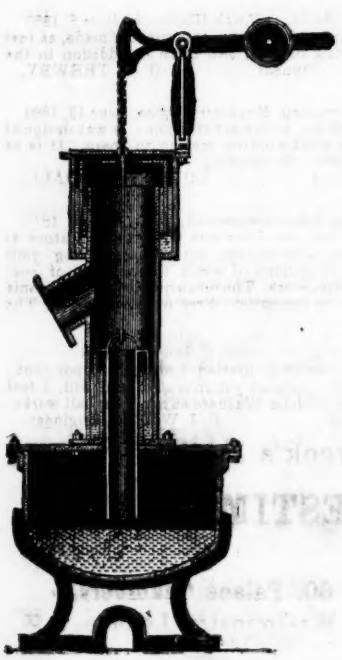
1. It acts irrespective of temperature.
2. It requires no motive power, but automatically adapts itself to production.
3. It may be fixed directly after the hydraulic main, by which prolonged contact of the gas with tar is avoided, and the highest standard of illuminating power is obtained which the coal is capable of giving; or it may be fixed directly after an ordinary air condenser, when it will arrest the vapoury globules which cooling alone will not stop, and the production of tar and ammonia water is thereby increased.
4. It effects a considerable saving in purification, through no tar getting to the material to clog its action.
5. It entirely supersedes the necessity of scrubbers; and if wet sawdust be used in a purifier, washers also are unnecessary.
6. It occupies but little space, and avoids that which is now considered a disadvantage—the too much cooling, scrubbing, and washing of gas.

Further particulars may be obtained of

GEO. BOWER, St. Neots, Hunts.

NOTE.—*Gas-works contracted for complete, or apparatus supplied in detail from the retort to the burner. "The Gas and Water Engineer's Book of Reference," post free, 5s. "Handy Abstract of the Public Health Act, 1875," post free, 1s.*

SELF-ACTING REMOVABLE DIP-PIPE,
PATENTED BY
CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

MESSRS. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

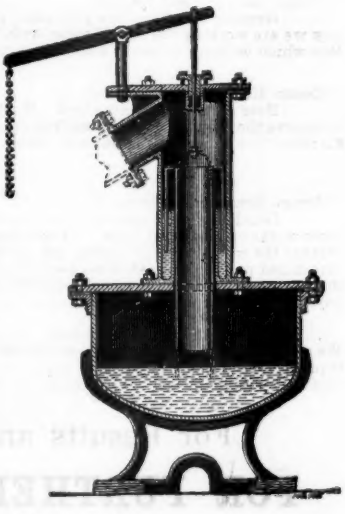
Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

MESSRS. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiry, it is with very much pleasure thatI endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,
(Signed) W. CRICKMAY,
Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,
104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months. It requires very little attention, and cannot get out of order.

These Machines, which contain from 3200 feet to 65,000 feet of Wetted Surface, are supplied to the following Gas-Works:—

	Feet per Day.
The Gaslight Company, London—	
Beckton	5,000,000
Bromley	7,000,000
St. Pancras	3,000,000
Bradford Corporation	1,000,000
Bremen	150,000
Buxton Local Board	250,000
Dukinfield Local Board	500,000
Driffield Company	100,000
Goole Company	250,000
Glossop Company	300,000
Holywood Company	125,000
Heywood Local Board	600,000
Leeds Corporation	2,000,000
Leominster Company	150,000
Maidstone Company	1,000,000
Phœnix Company, Greenwich	2,500,000
„ „ Vauxhall	3,000,000
Woolwich Equitable Company	400,000
Yeadon Company	500,000

And many in course of Construction, among others—

Feet per Day each.	For	Feet per Day each.	For
Four for 3,000,000	Corporation of Leeds.	One for 1,000,000	West Bromwich Improvement [Commissioners.
Three „ 1,750,000	Corporation of Salford. [Station.		
One „ 2,500,000	The Gaslight Co., Shoreditch	One „ 750,000	Radcliffe and Pilkington Gas Co.
Two „ 1,250,000	The Gaslight Company, Beckton.	One „ 500,000	Oldbury Local Board.
One „ 3,000,000	London Gas Co., Nine Elms.	One „ 150,000	Falmouth Gas Company.
One „ 1,250,000	Corporation of Nottingham.	One „ 250,000	European Gas Company, Rouen.
One „ 2,000,000	Cheltenham Gas Company.	One „ 200,000	Deal Gas Company.

TESTIMONIALS.

Messrs. KIRKHAM and HERSEY. *The Gaslight and Coke Company, Beckton, North Woolwich, June 8, 1880.*

Gentlemen,—I enclose you some particulars of the working of your Washers here, and I intend having some more experiments made, as just now we are working the first Washer with liquor, and the second with water. Of course the fact of our having ordered two more in addition to the four which we have in use is a sufficient indication of my opinion of the value of the Washer. (Signed) G. C. TREWBY.

Messrs. KIRKHAM and HERSEY. *South Metropolitan (late Phœnix) Gaslight Company, Engineer's Office, June 19, 1880.*

Dear Sirs,—The "Standard" Washer which you supplied for use at our Vauxhall station has afforded me entire satisfaction. It was designed to remove the ammonia from 3 million cubic feet of gas per day, and during the past winter it did so with a good working margin to spare. It is as excellent now in workmanship as in design, and is well worthy of the general acceptance with which it appears to be meeting.

I am, faithfully yours, (Signed) CORBET WOODALL.

Messrs. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug. 12, 1879.*

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free), obtained from a large number of tests, was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 80 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works.

(Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

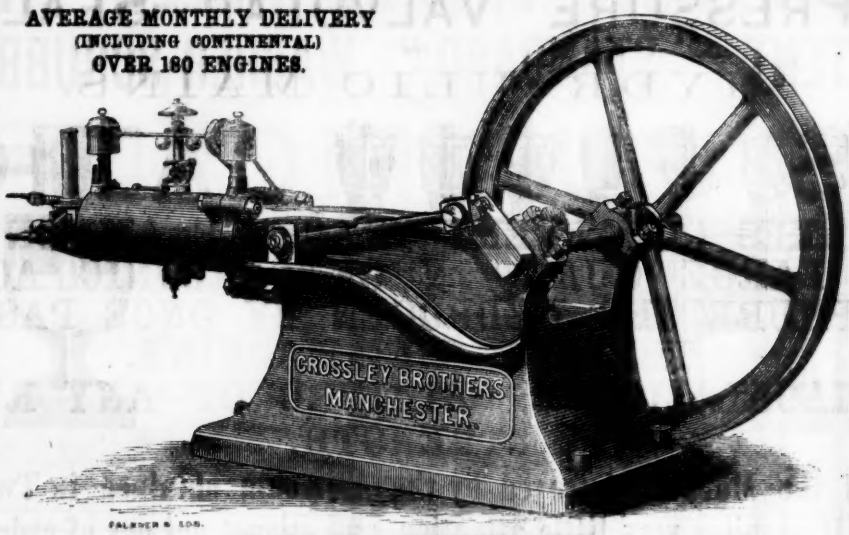
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

These Engines are used at the following Gas-Works:—Birmingham, Brentford, Bucharest, Bishop Stortford, Driffield, Dundalk, Dundee, Dublin, Huddersfield, Hinckley. London—London Gas-Works, Phœnix Gas Co., Gaslight and Coke Co., South Metropolitan Gas Co., Commercial Gas Co., Crystal Palace District. Leominster, Edinburgh and Leith, Ludlow Union, Lancaster, Maidstone, Nuneaton, Northampton,

AVERAGE MONTHLY DELIVERY
(INCLUDING CONTINENTAL)
OVER 180 ENGINES.



Shanghai, Sheffield, Worcester, Wantage, &c.

Over 2500 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE,

From ½ to 40 Horse Power Indicated.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES:
Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS,

LONDON HOUSE:
116, Queen Victoria St., E.C.

MANCHESTER.

WARNER'S RETORT-HOUSE MACHINERY.

[*As Illustrated and Described in the* JOURNAL *for May* 4.]

Communications to be addressed to

W. J. WARNER, GAS-WORKS, SOUTH SHIELDS.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE

RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

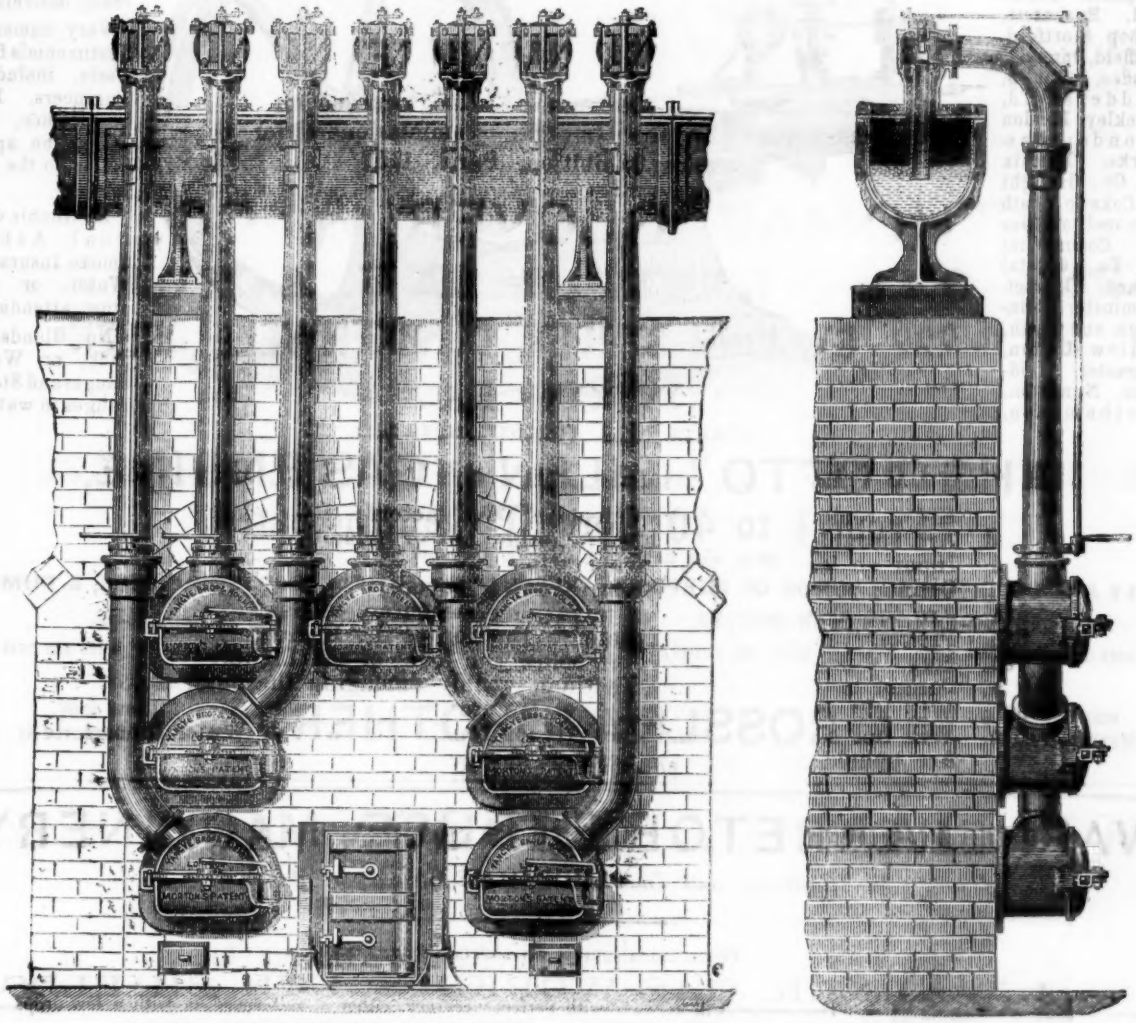
WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4 inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, because the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

(84) EIGHTY-FOUR more are being fitted to the Mains in the New Retort-House of the Gas-Works at Brentford, and they can be readily applied to existing Hydraulic Mains generally.

They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

"Gentlemen,—I have determined to use your HOLMAN'S PATENT NON-PRESSURE VALVULAR SEAL-PIPES in our new Retort-House. Will you, in the meantime, send me, as soon as you can, four as you are now making them. I expect to hear of a large demand for these Pipes. I like the idea of always maintaining a passage through an ordinary dip."

ESTIMATES for Retort Work, including Mouthpieces fitted with Morton's Patent Self-Sealing Lids and Holman's Self-Sustaining Cross-Bars and Fastenings, Hydraulic Mains and Ascension-Pipes, fitted with Holman's Patent Non-Pressure Valvular Seal-Pipes complete (as per accompanying illustration), will be forwarded to Engineers on receipt of particulars of intended erections, or re-setting of Retorts during the current or ensuing season.

Engineers preparing Specifications will be furnished with Tracings and all necessary data on application.

Sole Makers:

TANGYE BROTHERS AND HOLMAN,
HYDRAULIC AND GAS ENGINEERS,
CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

London, 1851. New York. 1853. Paris, 1855. London. 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

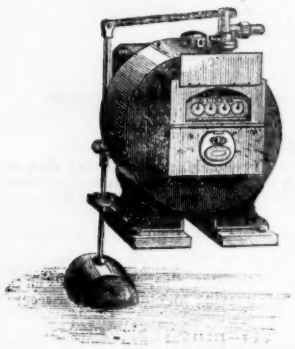
LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.

(ESTABLISHED 1816.)



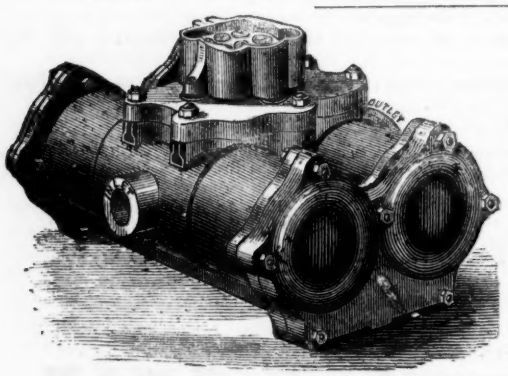
LOW-PRESSURE WATER-METER.

This Meter will register with perfect accuracy, either at full speed, or with a few drops only passing through it.

It must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below.

Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply a the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



HIGH-PRESSURE WATER-METER.

The Union Water-Meter, of which an external view is here given, is of the positive class—*i.e.*, a Meter in which a measuring chamber is alternately filled and emptied, each filling being duly recorded. It is formed of two cylinders, with double pistons in each, having a rotary-valve of peculiar construction, which is worked from cams on the piston-rods.

It is claimed for this Meter, among its advantages over other Piston Meters in use, that it is extremely small and compact, and that its durability and accuracy have been proved by the fact that upwards of 20,000 of them, of various sizes, are in successful operation in the States. In England the instrument has been fully tested by several Water Engineers of eminence, and pronounced by them as a reliable and satisfactory register of water supply; it is also economical in cost.

ALL METERS are TESTED with 60 lbs. pressure before they are sent out.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

J. B.—*Your letter, which is in type, is unavoidably held over till next week.*

C. S.—*Too late for notice this week.*

We must repeat a notice we have frequently given, that communications intended for the forthcoming number of the JOURNAL *should reach the Office by Saturday morning.*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 14, 1880.

Circular to Gas Companies.

On the last day of the late session of Parliament, Mr. Arthur Arnold, for Sir George Campbell, gave notice of a motion for next session, to call attention "to the excessive badness and "cost of the London gas, and the bad quality of the coal of "which it is made, and to move that measures should be "taken to compel the Companies having a monopoly of gas "supply in London to make the gas as good as that supplied "in Edinburgh and other towns." The coming session is currently expected to be full of surprises, and likely to be occupied with several measures of reform having reference to things political, administrative, and social; but one of the greatest surprises it could offer would be the spectacle of any practical result arising from this motion of Sir George Campbell's, and among all possible projects of reform it is most unlikely that the upsetting of the gas legislation of the Metropolis for a generation will be included. The Government will have too much other work on their hands to care to support the member for Kirkcaldy in his self-appointed crusade against the Gas Companies, and unless we are greatly mistaken both in the man and the matter he has taken in hand, he will scarcely be able to imitate the procedure or emulate the fame of Mr. Plimsoll, who, upon a memorable occasion, fought the House of Commons and the Government single-handed, and won. What the Gas Companies have done at this time to rouse Sir George Campbell's ire, and why Sir George Campbell has undertaken their castigation, are twin mysteries which we are unable to solve, even if they were worth the trouble of an inquiry. Patriotism may have something to do with it, for although a large quantity of Scotch cannel is used in London, the bulk of the coal carbonized is English; yet this cannot be the sole reason, unless we are to believe that Sir George Campbell is more patriotic, or parochial, than other Scotch members. The worthy knight is, however, somewhat erratic in his choice of subjects for attack, and no less catholic in his purview. Turks and missionaries, gunboats and gas companies, are all game for him; his mental grasp includes them all, and he apparently feels capable of discoursing on the intricacies of a diplomatic settlement or delivering a lecture on the illuminating power and chemical composition of gas with equal authority. But facts are notoriously "chiels that winna ding," as Sir George's compatriots would say; and however safely that gentleman may disport himself among the intangible expressions of general politics, where opinions and not facts form the subject of debate, it is plain that he knows nothing whatever about the realities of gas polity, and that the "border" which separates England from Scotland in gas matters is not found in his mental geography. It is too late to-day to discuss the difference between Edinburgh and London in respect of gas supply. Sir George Campbell does not appear to know of any distinction other than that one is all good and the other all bad. Such a want of instruction in one of our legislators is deplorable, and the member for Kirkcaldy cannot be better occupied during the recess than in consulting one or two experts, whose counsel, if after a little rudimentary instruction he persists in his motion, may prevent the "excessive "badness" from being more conspicuous in his own arguments than in the object of his denunciations.

The Commissioners of Sewers of the City of London had before them on Friday last whatever tenders for lighting the main thoroughfares of the City with the electric light their liberal invitation has been able to procure. The general public will have no means of knowing for some time what may be the practical outcome of this action on the part of the City Authorities. The opportunity they have provided for the exhibition of electric lighting on the grandest scale yet witnessed has, we may be sure, been eagerly grasped by more than one of the enterprising Companies which have been formed to extend and develop the various systems of lighting by electricity now before the public. In one respect the magnitude of the experiment to which the Sewers Commissioners stand in a measure committed is a satisfactory feature of it. Apart from the increased solicitude which the carrying out of such a considerable undertaking must bring upon the Commissioners and on those to whom the work is confided, there is the consideration that would-be contractors will be deterred from tendering at unprofitably low prices with ulterior objects, because the scheme is too vast to be used as an advertisement. This reflection is not without comfort to those who do not regard the new luminary with any favour, and who know where one of its weaknesses lies. Another weak point, which we presume the professional advisers of the Commission will not overlook, is generally to be found in what its friends think the strongest recommendation of the light—its illuminating power. With most electric lamps the light they are supposed to be capable of affording needs to be calculated on the same basis as the amount of sulphur impurities in gas; the average of three days should be taken, or, according to some witnesses, the maximum of any indeterminate period is more likely to be the advertised figure. We shall wait with much curiosity the report of the Sewers Committee on the proposals submitted to them. Whatever action they take will be fruitful of interest; while their failure to proceed, should that be the end of their preliminary essay, will be still more instructive.

The annual report and accounts of the Gas Committee of the Nottingham Town Council were presented to the Council at their meeting on Monday, the 6th inst., and were eventually adopted, after a discussion as to the accounts not having been audited by the Borough Auditors, a motion to refer them back to the Committee for this reason being lost. The balance on the profit and loss account in favour of the Committee is

£23,226 14s. 5d., of which £12,500 has been handed over to the Council for general purposes, the sum of £7021 2s. 6d. has been devoted to the extinction of 90 gas annuities, and the balance of £3705 11s. 11d. has been carried to the credit of the reserve and sinking fund. The Committee further recommended a reduction of twopence per thousand feet in the price of gas, and after considerable opposition the Council sanctioned their proposal. The arguments in favour of the reduction were so cogent, and pointed with such force from the past history of the gas undertaking since it has been in the hands of the Corporation, that any other course would have appeared impossible, did we not know the irrationality which so frequently marks the action of corporate bodies. When a Gas Committee happens to be strong, it is seldom that the interests of gas consumers are neglected. It is but natural that members of an administrative Committee entrusted with the management of a concern which brings them prominently before their fellow-townsmen in a twofold capacity, should wish to stand well with their constituents and customers. But with the best intentions they are sometimes defeated by colleagues whose idol is the ratepayer, and in such cases it is difficult to say whether the Gas Committee or their customers outside are the more to be pitied. It is, however, pleasant to be able to record the fact that in one more important town the Chairman of the Gas Committee and his supporters have won a victory in the cause of equitable administration.

The report "On the Best Means for the Development of "Light from Coal Gas of Different Qualities," by Dr. William Wallace, Professor Dittmar, and Mr. John Pattinson, presented to the late meeting of the British Association at Swansea, and printed in the last number of the JOURNAL, is the sole example of matter specially interesting to gas engineers furnished at this gathering. The communication itself is marked with much care and freedom in research, and its conclusions, if not particularly novel, are instructive, and have all the advantage of independent authority; they also bring the comparison of burners down to the present day. The utility of governors in direct connection with every burner is dwelt on very strongly by the authors, and these useful appliances are now so easily obtainable by every gas consumer that their use may be expected to be much extended. The report generally is very readable, and its descriptions and tables are clear and comprehensive. We must confess to a feeling of something like jealousy for the British Association of Gas Managers on seeing work of this nature left to be performed by such an omnivorous organization as the great society in question. There is no reason why special researches of this kind should not be performed by the only body of men in the kingdom who are able to bring any valuable criticism to bear on such statements, or to profit by any improvements in existing apparatus which may be suggested on the study of data so compiled. We had not the British Association specially in view when recommending, as we have repeatedly done, to our own chief technical society, combined action in original research; but that advice is now pointed afresh by the present instance of what ought to be considered little else than trespass.

Quiet progress has marked the last year's history of the Sunderland Gas Company, and the Chairman, at the annual general meeting of the Company held on the 1st inst., found himself with a paucity of interesting topics for his speech. Lack of stirring incidents is, however, not a defect in the report of the Directors of a trading association. Such statements as the Chairman was able to make were highly satisfactory. During the last six years the price of gas in Sunderland has been reduced five times, and another reduction was notified on the present occasion. It was stated that although the last reduction was equal to a loss of £1000 to the Company, as the accounts then stood, the actual diminution in the amount received for gas had been £134 only, in consequence of the elasticity in the rentals following the reduced price. The Company have recently made extensive additions to their manufacturing plant, and there can be no doubt that while the Directors continue to pursue their present policy their business will rapidly increase.

The Wakefield Gas Company, whose half-yearly general meeting was held on the 16th ult., have also found satisfactory results to proceed from a reduction in price. The profit on their half year's working was £6165 19s. 4d., as against £5862 in the corresponding months of last year, or an increase of £303, notwithstanding a reduction representing £750 on the half year's income. The position of the Company is generally good.

The Directors of the Canterbury Gas and Water Company have to report that the profits realized during the past half year enable them to pay the usual dividend to the Shareholders, and to give a bonus to the gas consumers during the two quarters ending the 31st of December next to the extent of fivepence on every thousand feet of gas sold. The reason which induced the Directors to give a bonus, instead of notifying a definite reduction in price, is stated to be their inability to foresee the amount of their future profits. With all deference to any local influences that, although not named in the report, may possibly exist to render the prospects of the Company exceptionally vague, we cannot think the action of the Directors particularly wise. One of the principal objects, as it is a tolerably certain result, of a reduction in the price of gas, is the increase of its consumption; but to secure this result the reduction must be certain, and, as far as may be, unalterable. A constant reliable diminution in cost will naturally do more to give the public confidence, and induce freer use of gas, than spasmodic bounties can possibly effect. In the latter case the whole value of the gift is destroyed by its temporary character; the gratitude of the community has no time to act in the practical shape of enlarged demand, before its exciting cause again disappears. General considerations such as these induce us to form the opinion that the Directors of the Canterbury Gas Company would have done more good to themselves and to the consumers by permanently reducing their selling price by threepence per thousand feet, than by the apparently more liberal course which they have pursued.

The case of conspiracy to defraud the South Metropolitan Gas Company, by tampering with a consumer's wet meter belonging to the Company, which was reported in the JOURNAL of the 31st ult., has been decided at the Surrey Sessions, whither the accused were sent for trial by the Magistrate at the Lambeth Police Court, where the case was originally heard. It will be remembered that the facts of the case, as then alleged, were that the prisoner Joseph Horton, a gas-fitter, offered to save the consumption of gas of Thomas Henry Carman, a licensed victualler, if he had a wet meter. Carman then took Horton to a billiard-room belonging to his son William Thomas Carman, and managed by George Phillips, and in the presence and with the connivance of the younger Carman and Phillips, Horton endeavoured to pierce the drum of the meter, with the object of allowing gas to pass without registration. He only succeeded in piercing the guard, but the meter was, of course, damaged to that extent. All the four persons named were committed for trial, chiefly on the evidence of a labourer who assisted Horton, and who became dissatisfied with his share of the money which Horton received for the job. The defence was that the meter was out of order, and that Horton was called in to put it right, and that there was no intention to defraud. After an hour's deliberation, the jury acquitted Phillips and Carman, jun., and found the other two prisoners guilty, but recommended Carman to mercy, and he was therefore sentenced to three months imprisonment only, Horton being sent to gaol for four months. Thus ends a rare and instructive case, the most satisfactory feature in it being that the design of the prisoners did not succeed, so that the uncertainty attending attempts of this nature, no less than the punishment which follows their discovery, may be expected to exercise a deterrent influence on any evilly-disposed persons who might otherwise be tempted to use similar means for obtaining gas without payment.

The paper on "Coal Seams" read by Mr. Eastwood, of Batley, at the Halifax meeting of the Manchester District Institution of Gas Engineers, is an example of what may be done for the general good by a painstaking observer of things which lie at his own door. The coal so exhaustively examined *in situ* and in the laboratory by Mr. Eastwood is naturally that of the district which supplies his own works; but the observations he makes on the different points that should engage a gas manager's attention in reference to any coal with which he may be supplied, are of wider application. It is not a novel fact that there are different qualities of coal to be found in the same seam; but the magnitude of these differences has not before been so clearly pointed out. Although to some extent the coal consumer is at the mercy of the producer as regards the selection of coal from the seam, a knowledge that the purchaser is fully alive to the tricks of the trade, and constantly examines the material with which he is supplied, or, better still, the desire to maintain the character of his business, should prevent the coal-

owner from sending out the worst product of the seam for gas-making purposes.

Mr. W. Livesey, the Secretary of the Gas and Water Companies Association, has forwarded to all the Companies who are subscribers to the Association, copies of the Employers Liability Act as now passed, accompanied by a note "advising "that full acquaintance may be made with its provisions "before it comes into operation." Although we have little sympathy with the losses sustained by those Companies who abstain, and are losers by reason of their abstaining from joining the Association, yet it is our duty to repeat Mr. Livesey's advice to them. The general provisions of the Act will be found explained in detail in another column.

Water and Sanitary Notes.

Mr. Henry Robinson, M.I.C.E., having had his attention called to Lieut.-Col. Bolton's remarks on the "occasional cat" and other nuisances connected with open cisterns, proposes the introduction of a law whereby all landlords whose property is in an insanitary condition shall be liable to fine and imprisonment. This would be a critical *régime* for small property owners, whose tenants are often fearfully unmindful of what is requisite for health and decency. Moreover, foul cisterns are not limited to small houses. A West-end club once had a water-cistern in a most outrageous state. Who, in such a case, should be responsible before the law, supposing the house either belonged to the club or were held on lease? Even civic authorities may be defaulters in sanitary matters. We remember having heard not very long since of something being wrong with the water-tank at the Mansion House. The owners of small property are frequently required to rectify sanitary defects in their houses, and are made to obey the law. But when things are put right, the difficulty is to keep them so. Mr. Robinson is doubtless justified in saying that there is "far too much neglect and apathy in matters affect-"ing the sanitary condition of houses, and that the Vestries "fail to discharge the duty which is imposed on them." But the fault of the Vestries would not be remedied by a law which simply threatened a landlord with pains and penalties. The law would still remain inoperative, unless the Vestries bestirred themselves, or unless some more active agency took their place. Mr. Robinson should amend his argument, by showing how his law is to be enforced. Perhaps he means to invoke the police. All would be right if the Vestries did their duty. But they "don't." Logically, Mr. Robinson should propose to put the defaulting Vestries in prison. We acknowledge that this would be what he designates "a drastic "remedy." Doubtless a pressure of some kind is wanted in that quarter. The law is good, but the administrator is wanting. So far as the cisterns are concerned, the constant supply will save the occupiers of tenement houses from the peril of poisonous water. But Mr. Robinson reckons that years will elapse before this will be accomplished, whether the work be done by the Water Companies "or by their suc-"cessors;" and there are other evils besides those which appertain to dirty cisterns.

Responsible public authorities are not always fortunate in their management of water-works. The Dean and Chapter of Ely, and certain ratepayers, have memorialized the Local Government Board on the character of the water supplied to that city by the Local Board of Health. The latter, on being called upon to give an account of their proceedings, have candidly acknowledged that "they cannot defend the present "character of the water as supplied to the inhabitants," but they add that they "have been, and are, engaged in taking "measures to improve it." The measures of improvement appear to be very limited, and the Local Board plead that they should not be urged to any larger outlay until they have discharged the debt incurred some twenty-five years ago for the cost of the original works. The greater part of the burden will be got rid of in five years, and the Local Board desire to see any further expenditure on a large scale post-poned until that period. They are also looking forward with apprehension to the operation of the Rivers Pollution Act, by which they will be compelled to withdraw the whole of the town sewage from the river at a great expense, perhaps including the cost of a sewage farm. The Local Government Board, as might be expected, take a somewhat different view of the question from that which is thus ex-pressed by the ruling powers at Ely. The latter are advised that any delay on such grounds as they have put forward "would expose them to very serious responsibility." Whether the Local Board should continue to take their water supply from the river, or should resort to a deep well in the chalk, is also a question. Finally, the Central Authority calls upon the Local Board to forward plans and estimates for carrying out a suitable scheme of water supply, with an application for power to raise the necessary loan.

While Ely has a supply of bad water, Cardiff has been in danger of having almost none at all. The want of water is said to have been severely felt for some time past in that famous South Wales seaport. Last week, the inhabitants were looking out anxiously for rain, which was said to offer "the only remedy." In the meantime, a placard was issued by the Town Clerk, calling upon the people to economize their consumption of water as much as they possibly could. "The necessity of increasing the works," it is said, "is now "admitted on all hands," and the Corporation are expected to buy land for the purpose. Had the water supply still been the property of a Company, perhaps Cardiff would have been less patient, and "all hands" would have seen the necessity of extension a little sooner.

The Lords of the Admiralty, on visiting Portsmouth lately, found occasion to hold a species of conference on the sewage question with the Mayor and the Borough Engineer. Ports-mouth disposes of its sewage in such a way as to cause con-siderable annoyance to the military authorities. To mitigate this evil, the Town Council propose to construct sewage reservoirs, so that the discharge from the outfall may take place at the most suitable time, and yet the inhabitants may not have the drainage of their houses checked. But the site chosen for the reservoirs appears to be unacceptable to the naval authorities, so that between the army and the navy it would seem that the Town Council are in a dilemma. The sewage outfall has already emptied Fort Cumberland of its defenders, and the site for the reservoirs threatens other establishments. The sewage must go somewhere, and we hope the Town Council will soon see what they are to do with it.

Rowley Park, a flourishing and highly respectable suburb of Stafford, is in difficulties about its drainage, and the inhabitants are apparently disposed to regret their past policy of isolation in refusing to be attached to the adjacent borough. It is now proposed to make Rowley Park, together with a neighbouring locality called Dean's Hill, into a special drainage district, under the Stafford Board of Guardians as the Rural Sanitary Authority. It is evidently necessary that somebody should take care of Rowley, for at present the sewage goes into a huge covered tank, which is said to be "seldom, if ever, cleansed." Of course there must be an end to that state of things at some time, and the sooner the better.

A statement has been made public that the health of Dartford is imperilled by the sewerage works now in course of execution, coupled with the drying-up of the wells. The local Medical Officer of Health has disputed the accuracy of the statement, but with an admission that "there has "been a good deal of diarrhœa, some of the cases being "of a choleraic type." Up to Midsummer the mortality from all causes was less than in the corresponding portion of the previous year, but during the last two months the mortality has been nearly double that of the same period last year. While this excess is admitted, as also the prevalence of sickness, the Medical Officer of Health says: "I have no "reason to suppose that any illness in Dartford has been "caused by the sewerage works."

Accrington Gas and Water Company.—The half-yearly general meeting of this Company was held on the 23rd ult.—Mr. S. Rhodes in the chair. The Directors reported that the increase in the share capital of the Company during the past half year amounted to £9633 15s. The expenditure on capital account had been £2688 19s. 1d., principally incurred in connection with the works at Dean reservoir, Great Harwood. They also reported a continued extension and improvement in the demand for both gas and water. There was a gross increase over the corresponding half of last year of upwards of £1600. That increase of revenue would to a great extent enable the Directors to make those necessary replacements and repairs in the purifying department to which their attention was called at the last half-yearly meeting. The Directors were incurring this outlay not only to meet the increasing production at the Accrington and Oaken-shaw works, but also to supply as pure gas as possible, and this they hoped to accomplish, their policy being to supply good and pure gas at such a price as would encourage and extend its use for both heating and illumi-nating purposes. The Directors were again making a further reduction in the price of gas, practically bringing the net price to small consumers to 3s. 7d. per 1000 cubic feet, and to large consumers 3s. 4d. per 1000 cubic feet. This reduction they thought would not interfere with the present rate of dividend. The balance of revenue available for dividend after meeting interest and all other demands was £6790 6s. 2½d., out of which it was recommended that the usual maximum dividends of 10 and 8 per cent. should be paid, the balance to be carried forward to the current year's accounts. The number of new consumers during the half year was as follows:—Gas, 137; water, 120—total, 257. The report was confirmed, and a dividend in accordance with the recommendation was declared

THE EMPLOYERS LIABILITY ACT.

THE Employers Liability Bill has at length received the Royal Assent, and is therefore law; the Act will come into operation on Jan. 1, 1881. The vicissitudes of the Bill have so far been numerous, and have left their traces upon it, for the Act as it now stands is not identical with the Bill as it was first introduced; it is less vague, but no clearer. It might be interesting, but it would be unprofitable to trace the origin and object of the more important alterations which the friends of employers and employed have tried to make in the provisions of the Bill since its introduction. Amendments of various kinds, proposing to alter, omit, or add to the few clauses of which the Bill was first composed, and when it was down for discussion filling the parliamentary notice-paper, night after night, with matter many times exceeding in bulk the Bill itself, have met with more or less acceptance, until at last the measure has emerged in the state in which people outside Parliament will have to deal with it. To the very last, when the House of Commons considered the Lords amendments, on the 2nd inst., the differences of opinion still prevailing in the Lower House, with respect to the period, if any, to which the operation of the Act should be limited, were so grave as almost to imperil the passage of the Bill this year; but the difficulty was eventually overcome, and it must have been a great relief to the Government to see the last of one of their most troublesome measures.

As it now stands, the principle of the Act is chiefly contained in the first clause, which provides that if, after the commencement of the Act, personal injury is caused to a workman "(1) by reason of any defect in the ways, works, "machinery, plant, or stock-in-trade connected with, or used "in the business of the employer; or (2) by reason of the "negligence of any person in the service of the employer who "has superintendence entrusted to him; or (3) by reason of "the negligence of any person in the service of the employer "to whose orders or directions the workman at the time of the "injury was bound to conform, and did conform, where such "injury resulted from his having so conformed; or (4) by "reason of the act or omission of any person in the service of "the employer done or made in obedience to the rules or bye-"laws of the employer, or in obedience to particular instruc-"tions given by any persons delegated with the authority of "the employer; or (5) by reason of the negligence of any "person in the service of the employer who has charge or "control of any signal, points, locomotive engine, or train "upon a railway—the workman, or, in case the injury results "in death, the legal representatives of the workman, and any "persons entitled in case of death, shall have the same right "of compensation and remedies against the employer, as if "the workman had not been a workman of, nor in the "service of the employer, nor engaged in this work." The provisions of this clause are qualified by the clause which immediately follows it, under the heading of "Excep-"tions to the Amendment of the Law," and which appears to have for its object the embodiment in some degree of the principle of "common employment," of which so much was heard during the debates on the Bill. By this clause it is laid down that a workman shall not be entitled under the Act to any right of compensation or remedy against the employer, unless the defect that caused the accident arose from, or had not been discovered or remedied owing to the negligence of the employer, or of some person in his service whose duty it was to see that no such defect existed; or unless the injury resulted from some impropriety or defect in the rules, bye-laws, or instructions—special exception being made in favour of bye-laws which have been approved by a Secretary of State. Bye-laws thus authorized are not to be deemed in any case improper or defective. This is a very important exception indeed, as it embraces, as far as can be seen, railways, factories, and workshops under Government inspection, and the like. It still remains to be proved how far this exception can be held to apply, but we may remark that it throws on the State Authorities a greater responsibility than they have hitherto been saddled with. The bye-laws of Railway Companies, for example, in respect of their passenger fares, although sanctioned by the Board of Trade, have repeatedly been upset by the Courts, when they have been found in conflict with the principles of equity, on the ground that no one, whether in conjunction with Government officials or otherwise, can make regulations in defiance of the common right. But here we have similarly-made rules constituted infallible in special terms, and we cannot think the innovation a happy one. Again, if a workman knew of the defect by which he has suffered injury, and failed to report it to his superiors within a reasonable time, he forfeits his rights of compensation, unless he was aware that his employer or his superiors already knew of the defect or negligence. This provision is a fine opening for dispute in the event of accident, and may be expected to lead to a vast amount of cross-swearing in the trial of a contested claim. As a general rule, it may be said that workmen know more about the state of the machinery, tackle, or scaffolding in connection with which their work is done, than any foreman or inspector, who has to see to many things in different places; and yet the foreman or inspector is commonly supposed to know everything, and the workman will seldom go out of his way to draw his superior's attention to any defect, especially if he thinks himself liable to the suspicion of having caused it in any way, unless the damage is very serious, and cannot well be left to be found out by the foreman on his next round.

The three next clauses refer to the money question. The amount recoverable as compensation under the Act is not to exceed a sum equivalent to the estimated earnings, during the three years preceding the injury, of a person in the same grade, employed during those years in the like employment and in the district in which the injured person works. Moreover, notice of action must be given within six weeks, and the action commenced within six months from the time of death, power being, however, given to the judge to grant an extension of time. The compensation awarded by the Act is to be liable to the deduction of any penalty or portion of a penalty which the injured party may have recovered under any other Act; and no other penalty can be recovered by a workman after he has benefited by this Act. Actions are to be brought in a County Court, but may be removed to a Superior Court. Assessors may be appointed to assist the judge in estimating the amount of compensation.

The next clause refers to the manner of service of notices, &c., and calls for no particular comment; but the clause wherein the definitions of the terms used in the Act are explained is of very great importance. It is laid down that unless the context clearly intends otherwise, the expression *person who has superintendence entrusted to him* means a person whose sole or principal duty is that of superintendence, and who is not ordinarily employed in manual labour. This definition would seem to put a man of the class of unskilled labourers at a disadvantage, as regards ability to obtain compensation, in comparison with a mechanic. There are many men of the former class employed to attend the latter, either singly as "mates" or in gangs, and they are compelled to follow their leader's instructions. In the event of injury it would sometimes be difficult to define the limits of the responsibility of the leading hand. The expression "employer" includes a body of persons corporate or incorporate. The expression "workman" includes railway servants and any person to whom the Employers and Workmen Act of 1875 applies. The prevalence in many industries of piece-work, or more or less formal sub-contracts, also appears likely to cause complications in defining the term "employer." In the erection of engineering works, for example, much of the labour is done by agreement, the sub-contractor getting paid for the amount of work done, but being free to engage or discharge his own men, and to employ as many or as few as he pleases. In such cases the employment of more or less hands frequently makes all the difference between safe and dangerous work; but in case of accident the power of the workman to recover may be useless for want of resources on the part of the employer to meet any demand of the kind. On the other hand, if the immediate employer is to be passed over, where is the right party to be found? The original contract may have been let and sub-let many times over, and it would be no easy matter to distinguish between the various parties concerned in it in different degrees.

The Act, as we have stated, will be in operation from the beginning of next year, and it will then be seen whether its active existence will be less troubled than its period of incubation. Many measures which provoke bitter conflict during their passage into law have been found to sink into oblivion almost as soon as they have been incorporated into the Statute Book, and others which have been as hotly debated in Parliament have subsequently entered into a respectable existence of placid utility, somewhat disappointing perhaps to their sponsors, but not less so to their opponents. We cannot think that the present Act will fall into either of these classes. It is only too probable that the storms which have marked its discussion are but premonitory of yet sterner and more bitter conflicts in the Law Courts, where its powers will be tested; for if there ever was a lawyer's Act, this is one. It may be said of it with even greater truth than is usually contained in the remark, that the judges will have in the first place to make the law which they are supposed to administer. Its provisions are full of

pitfalls, and until these are marked out by the misfortunes of suitors who may be expected to come to grief in them during the next few years, it would be waste of time to seek to anticipate the practical results of the Act. Whether it has been improved or not by the apparently experimental character imparted by its limitation to a period of seven years, is a question it were idle now to discuss. It must be taken for what it is—until it is amended or repealed. The former eventuality is more probable than the latter, as a wide-reaching measure of this kind soon draws round it special social arrangements which cannot well be disturbed.

It is impossible to leave the subject without some reference to the cognate question of insurance, concerning which much loose talk has lately flowed. The common accidents of life are capable of reduction to arithmetical ratios for purposes of insurance, and it will be easy for employers to protect themselves by a special adaptation of the same principle. The effect of the Act on workmen's accident clubs is uncertain; it may possibly tend to destroy much of the feeling of the necessity for provident action on their own part which has led to the formation of these clubs, and if so it will be a very doubtful blessing to the workman. We cannot, however, follow up the various openings for conjecture presented by the secondary action of the new law, as they are endless. For its collateral developments, as for its primary effects, we must wait until time gives us facts instead of hypotheses to deal with.

Notes.

[*This column is intended to contain miscellaneous memoranda on topics of general professional interest to our readers. We shall be glad to receive for insertion in it any scraps of information, observations of facts, or descriptions of apparatus, &c., which may be worth publication, and yet may not be considered suitable for our "Correspondence" column.*]

The Recent Meeting of the British Association at Swansea.

The meeting of the British Association at Swansea has come and gone. The attendance was small, as compared with former years, 914 tickets of Members and Associates having been sold—being the smallest number since the Hull Meeting in 1852. The meeting is adjourned to York next year under the presidency of Sir John Lubbock, Bart., M.P. Whilst the meeting was small in numbers, it was rich in science, and had lost nothing of its brilliancy, there being amongst their number James Abernethy, C.E., Professor W. Grylls Adams, Professor Allman (retiring President), Professor Ayrton, Sir Henry Barkly, Professor Bayley Balfour, Sir Antonio Brady, Boyd Dawkins, Captain Douglas Galton, Francis Galton, James Glaisher, Lieut.-Col. Godwin Austen, Augustus Vernon Harcourt, Professor Huntington, Dr. J. Gwyn Jeffreys, Baldwin Latham, Lieut.-Gen. Sir J. H. Lefroy, C.B., Dr. Stevenson Macadam, Donald MacAlister, Admiral Ommanney, Captain Bedford Pim, Andrew Crombie Ramsay, LL.D., F.R.S., President Elect; Professor George Rolleston, Dr. Sclater, Professor Seeley, Warrington Smyth, Professor Sollas, Sir Richard Temple, St. George Temple, Sir William Thomson, General Sir H. E. L. Thuillier, Professor Williamson, Lord Aberdare, Howel Gwyn, H. Hussey Vivian, L. L. Dillwyn, Dr. Siemens, and many local celebrities. Many of the papers read were of peculiar local and general interest, Professor Ramsay's opening address, Professor Boyd Dawkins's "Primeval Man," and Francis Galton's "Mental Imagery" securing large and enthusiastic audiences. The excursion list to the neighbouring works and places of interest was extensive and varied. Among those which were pronounced the most successful were visits to Dowlais Iron-Works; H.M. Dockyard at Pembroke; Coast of Gower and Bays; Llandilo and various castles; Landore Siemens Steel-Works, Mayam Park; Velindra Water-Works; ruins of Neath Abbey; and to Mrs. Crawshay at Langorse, Poole. At all the private excursions the guests were most sumptuously entertained. The excursions were under the direction of Mr. Thornton Andrews, C.E., and Mr. Robert Capper; and we are glad to see by *The Times* of the 2nd inst. that a special vote of thanks was awarded these gentlemen for the manner in which they had carried out this portion of the programme. As a further mark of approval, Mr. Andrews was elected to serve on the Committee of "Mechanical Science," Section G. Soirées were held in the Pavilion under the rays of the electric light, the same noise, unsteadiness, and flickering as heretofore characterizing this wonderful illuminant, which had to give way to gas at the later hours. At the Pavilion an exhibition of local manufactures, machinery, and scientific apparatus, had been collected; noticeable were the products from the Landore Siemens Steel-Works, Vivian's Copper-Works, Morfa Copper-Works, &c. At the concluding meeting, at the Music Hall, votes of thanks were passed to the local officers, and the Secretary, Dr. Sclater, alluded to the great hospitality which had been extended by the people of Swansea to the visitors.

The World's Production of Iron.

From statements made at the late meeting of the Iron and Steel Institute in Germany, it appears that the average yearly output of pig iron of the whole world is about 15 million tons. Of this enormous total Great Britain supplies about 6½ million tons; the United States yields over 2 million tons; Germany produces 1½ millions; France about equals the production of Germany; Belgium makes 500,000 tons, and none of the other European States reaches an annual production of 1 million tons. The United Kingdom, therefore, still produces more than three times as much pig iron as the United States, the next in order among the nations, but the ratio of the two countries to each other and to the total output has altered within the last 30 years. In 1850 Great Britain produced half the iron used in the world, and the United States about an eighth part; at the present time the home production does not reach half of the world's consumption, and the United States, having quadrupled its output in the same time, now yields one-seventh of the total. At the same time the home production has really trebled within the past 30 years, so that we still hold our own as to comparative progress; but as other nations are also progressing, the iron produced here becomes less important to our neighbours every year. To quote from the *Sheffield and Rotherham Independent*, from which the above statistics are taken, "it is evident that we shall have to continue cheapening the cost of production and searching for new customers if we are to maintain, not to say increase, our trade."

Photometry by Polarization.

In a recent number of the *Journal de Physique*, M. Crova recommends the use of M. Prazmowski's polarizer for photometric purposes. This is a peculiar kind of Nicol prism, having faces normal to the axis of the prism, the two halves of which are joined with linseed oil. It requires for its construction large pieces of spar, and the joint is not easily made, but the arrangement possesses several advantages. The layer of oil, unlike Canada balsam, causes very little loss of light, having an index of 1·485, or nearly the same as the extraordinary index of spar. The polarized field is limited, as in an ordinary Nicol's prism, by a red band on one side, where the total reflection of the ordinary ray commences; but the second limit, corresponding to total reflection of the extraordinary ray, is thrown out of the field of vision; thus the angular value of the polarized field is increased. The increase of field, the angular separation of the only coloured band, and the direction of its bases, normal to the axis, are valuable qualities in some cases. The positive value of polarization as a means of measuring the power of artificial light is still hypothetical, but mainly, perhaps, in consequence of the non-existence of suitable instruments for the application to practical purposes of a law concerning which too little is known that is useful, but a great deal that is as yet only curious.

American Pumping-Engines.

In the class of steam-pumps known as combined or direct acting, characterized by the pump plunger being in the same line as the piston-rod, and connected, or rather identical with it, an important improvement is claimed by Mr. Henry R. Worthington, of New York. The Worthington pump, in its latest and best form, has two steam cylinders and two pumps, which are cast together to form one machine, and the pistons and slide-valves of the two engines are so connected that the right-hand division moves the valve of the left-hand one, and *vice versâ*. No tappet, crank, or other rotary device is employed. As the right-hand piston nearly reaches the end of its stroke, the other starts, thus keeping the water flowing in a constant and unvarying stream. The plungers are thus permitted to halt momentarily, and allow the water-valves to close without slamming. This effectually prevents concussion of the valves, and the consequent jar of the pipes and connections. It is stated that pumping-engines on this model are in use for oil-pipe lines, some of them forcing 1500 barrels of oil per day through 100 miles of pipe, against a pressure of 1500 lbs. per square inch. These figures are on the authority of the *Scientific American* of the 4th inst., whence the data for this note are drawn. The arrangement of this double type of engine allows the use of the ordinary slide-valve, such as is used in common reciprocating engines. Single-cylinder pumps are usually constructed with auxiliary piston valve throws, more or less complicated in detail. One of the Worthington engines in use at the Newark (N.J.) Water-Works has a capacity of 8 million gallons daily.

Coal Gas Products in Soil.

Herr E. Königs, a German analytical chemist, has made an examination of earth which had become saturated with coal gas, such as is found surrounding old main-pipes. The analyst worked up samples of this earth into a paste acidulated with sulphuric acid, and passed a current of steam into the mixture. He then collected in glass receivers the gases and vapours that were given off. The bulk of the product consisted of naphthaline. Carbolic acid was not found in sensible quantity. The peculiar odour of soil after long contact with gas-pipes, therefore, appears to be due to the naphthaline which it contains, probably in company with volatile compounds of sulphur and carbon; but the latter are not present in any notable quantity. It does not appear, from the analyst's notes, that he made any separate examination of similar soil unimpregnated with gas, and, consequently, the exact nature of the changes, if any, due to the continued action of gas on earth was in this case left undetermined.

East Ardsley Gas Company.—The half-yearly general meeting of this Company was held on Monday, the 23rd ult.—Mr. G. V. Ellerton in the chair. The Secretary (Mr. Banks) read the Directors report for the half year ended June 30 last, from which it appeared that the business for that period had resulted in a profit of £128 10s. 10d., which enabled the Directors to recommend a dividend of 4 per cent. per annum on the old shares, and on all the new shares on which the second call had been paid. The Secretary read the statement of accounts, which showed that the income had been £480 3s. 8d. for the past six months. The Chairman moved the adoption of the report and accounts, and Mr. H. Waterhouse having seconded the motion, it was carried. The usual votes of thanks to the Directors and Chairman closed the proceedings.

Communicated Article.

ON THE AMOUNT OF LIGHT NAPHTHA IN COAL TAR, AND ITS PRACTICAL ILLUMINATIVE VALUE TO THE GAS MANUFACTURER.

By Mr. H. LEICESTER GREVILLE, F.C.S., &c.,
Chemist to the Commercial Gas Company.

(*Continued from p.* 335.)

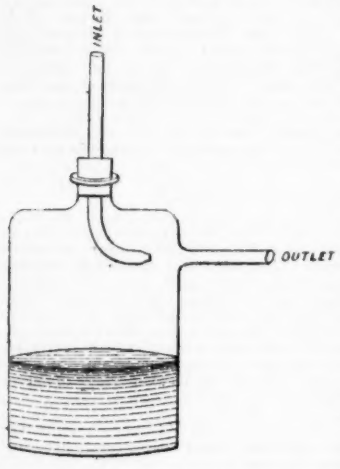
In my last article on this subject, a table was given showing the respective quantities of naphtha found in various samples of tar, taken from different portions of gas-works. The mean amount of light naphtha found in ordinary stock tar was, it will be remembered, 2·6 per cent. by volume. Now, if it is assumed that each ton of coal distilled yields 10 gallons of tar and 10,000 cubic feet of gas, the absolute quantity of light naphtha which is available for transfer to the gas can be easily calculated. I have taken round numbers in expressing the respective yields of tar and gas, in order to facilitate the calculation, the assumed figures being sufficiently near the truth for the purpose in view. Now 2·6 per cent. by volume of naphtha on 10 gallons represents a bulk equal to that which would be occupied by 18,200 grains of water, which amount represents the quantity to be distributed over 10,000 cubic feet of gas. The amount of available naphtha per 100 cubic feet is therefore 182 grains measure, or 1·82 grains measure per cubic foot. The equivalent of this quantity in weight is 1·65 grains.

Having ascertained the absolute quantity of light naphtha capable of transfer from the tar to the gas, the next point to determine was the amount of increased light to be derived from the addition of the naphtha in the quantity stated. The following table shows the results obtained in some experiments in this branch of the subject:—

Number of Experiment.	1	2	3	4
Initial lighting power of gas	16·33	16·60	15·8	15·8
Naphtha added, grains per cubic foot .	2·66	2·56	2·7	2·64
Lighting power of gas after addition of naphtha	17·86	18·00	17·1	17·2
Increased lighting power in candles due to addition of naphtha	1·53	1·40	1·3	1·4

Mean quantity of light naphtha in grains weight required to raise the lighting power of the gas by 1 candle . . 9·4
Mean quantity of grains to each cubic foot, 9·4 ÷ 5 . . 1·88

From the above figures can be calculated the equivalent lighting value of 120 grains of light naphtha as compared with sperm. As 9·4 grains of light naphtha were found to afford the light of 1 candle, 120 grains would be equal to 12·7 candles. This result is not widely different to the value assigned by Dr. Knublauch to pure benzole; it will be remembered that this value was 14·15 candles. I may state that the burner used in my experiments was the ordinary standard—viz., Sugg's "London" Argand—and that the method I used for impregnating the gas with the light naphtha was by passing it through a small two-necked bottle placed immediately under the burner. I at first experienced the same difficulty as Dr. Knublauch—viz., that the gas absorbed too large an amount of light naphtha to be subsequently burnt at the rate of 5 feet an hour. I therefore contrived a special apparatus for the purpose of limiting the quantity of light naphtha taken up by the gas, which may be briefly described as follows:—I procured a small bottle of blown glass, having an ordinary neck at the top and an outlet in the form of a tube blown into the side of the bottle, and extending in a horizontal direction, as shown in the annexed engraving. The neck of the bottle was fitted with a caoutchouc stopper, through which was passed a glass tube, the lower extremity of which was curved and drawn out so as to form a sort of nozzle. The curved part of the tube was turned so that the nozzle was brought opposite and near to the horizontal outlet. By this arrangement the gas flowing in a jet from the glass nozzle had a tendency to escape at once by the horizontal outlet, simply drawing with it a small quantity of the naphthalized atmosphere in the bottle. I found that with this apparatus I could easily limit the amount of naphtha absorbed by the gas to about 2·5 grains to the cubic foot. If it is desired to impart a larger quantity of naphtha to the gas, it is only necessary to lower the inlet-tube so that the nozzle discharges its jet of gas less in a line with the exit-pipe; the gas then has an increased tendency to mix with the atmosphere of the bottle before flowing away, and an increased naphthalization is the result. The apparatus worked well, and with a little care could be easily managed.



With regard to the lighting power which I have obtained from light naphtha, I think the figures may be taken as representing the *highest* obtainable illuminating value with ordinary gas consumed in the standard burner. My reason for forming this opinion is that with a liquid like naphtha, which consists of a mixture of hydrocarbons of different boiling points, those which possessed the lowest boiling points (benzole, &c.) would be the first to evaporate. It follows, therefore, that any experiments made by carburetting gas by light naphtha, by the simple evaporation of that liquid at the ordinary temperature, are practically equivalent to carburetting with benzole, and do not fairly represent the lighting value which would be obtained from the bulk of the naphtha. I endeavoured to ascertain the real lighting value of the naphtha by the direct addition of the liquid to gas in a holder, but the results varied disproportionately with varying quantities of naphtha, and were altogether unsatisfactory. This might arise from two causes—viz., the imperfect volatilization of the liquid in the holder, or the partial removal of naphtha during the subsequent passage of the gas to the burner, by the combined action of the friction of the pipes and the contact with water in the meter. The results were invariably lower than those obtained where the naphtha was added to the gas close to the point of consumption.

Taking the lighting value which my experiments, under the most favourable conditions, may assign to the light naphtha, it was found that an addition of 1·88 grains to the cubic foot of gas produced an increase of illuminating power equal to one candle. As the available quantity of light naphtha derivable from the tar was in the proportion of 1·65 grains to each cubic foot of gas, it will be seen that this amount represents a little less than a candle of increased lighting power.

As the results which have been obtained in practice wherever the Aitken and Young process has been submitted to a fair trial differ materially from those indicated by my experiments, I think there is but one conclusion to form in order to reconcile that which at first sight appears so discrepant. The conclusion is this, that the large increase in the lighting power of the gas which is obtained by the use of the Aitken and Young process is not directly due to the retention of the light naphthas, but is due to naphthaline which is retained in the gas, being prevented from separating out in the solid crystalline form by the increased amount of naphtha vapour which is present. To account for the large increase in lighting power obtained by the use of the analyzer, I think it is not only necessary to assume that the naphthaline which would be normally present in the gas is permanently retained, but that the gas becomes charged with an increased quantity in its passage through the analyzer, this increased amount being also retained permanently.

I am unable to state what amount of naphthaline is capable of retention in gas at ordinary temperatures by reason of the presence of a definite quantity of naphtha vapour. The experimental determination of such a question would be extremely difficult, but this much is known—viz., that naphthaline is a most valuable illuminating constituent of coal gas.

With regard to the actual lighting value of naphthaline, I made some experiments some time back with the Albo-Carbon light, from which some information may be derived. I may state briefly that the experiments consisted in burning gas, the lighting power of which was known, from a No. 1 Bray's fishtail, attached to an apparatus by which the gas became highly charged with naphthaline vapour. It was necessary to use a burner with small holes, on account of the richness of the gas. The initial lighting power of the gas with the standard burner was 15 candles, and the lighting power with the naphthalizing apparatus was 24·7 candles, with a gas consumption of 3·3 feet per hour, the consumption of naphthaline being at the rate of 103·8 grains per hour. As the initial lighting value of the gas was 15 candles, 5 feet consumption, the lighting power of 3·3 feet would be 9·9 candles. This gives 14·8 candles increase for a consumption of 103·8 grains of naphthaline, or 7 grains per candle. The light value of 120 grains of naphthaline would thus be 17·1 candles. This experiment does not admit of strict comparison with those made with the light naphtha, inasmuch as the burner used in the naphthaline test was not the same as that used to determine the initial value of the gas; at the same time the burner used for the naphthalized gas was, no doubt, well fitted to develop the lighting power from gas of such high illuminating value.

That the use of the Aitken and Young process tends to retain naphthaline in the gas is shown by the letter from Mr. Bell, which appeared in the JOURNAL for Sept. 9, 1879, and that gentleman also testifies to the increase of lighting power obtained by the use of the analyzer, as well as to the increase in the make of gas per ton of coal. With regard to Mr. Bell's figures, however, I quite concur in the remarks made by Mr. Patterson in the last of his series of able articles on "The Effects of the Contact of Tar with Coal Gas," published some time back in the JOURNAL. Mr. Patterson says that inasmuch as Mr. Bell introduced an exhauster about the same time that he adopted the Aitken and Young process, it is impossible to say what proportion of the improved results which he obtained were due to the exhauster, and what proportion to the analyzer. More definite testimony as to the effects of the analyzer on the quality and quantity of the gas obtained per ton of coal is to be found in the results of the experiments made by the West of Scotland Association of Gas Managers. Taking a mean of their experiments, the lighting power of the gas was increased by 5·27 candles, the amount of light naphtha transferred to the gas being represented by 2 per cent. on the tar. The increase in the make of gas was in one case 90 cubic feet per ton of coal. What amount of tar was produced from each ton of the coal used is not given; but if taken at 12 gallons, the actual quantity of light naphtha transferred to the gas may be taken at 16,800 grains measure, and as the make amounted to 8634 cubic feet, the proportion of naphtha to each cubic foot of gas was 1·94 grains. As this produced a gain of 5·27 candles, it is obvious that if a *pro ratâ* argument can be taken the practical value of the 1·82 grains of light

naphtha per cubic foot which I have shown as the available quantity, at ordinary London gas-works, should be no less than 4·9 candles—a very considerable amount.

I will conclude with a few general remarks on the separation of tar from gas. If it is admitted that it is desirable to retain all the available light hydrocarbons in the gas, it seems by no means an economical plan to use such means of separating the tar, that a large proportion of light hydrocarbons are also separated at the same time, involving the subsequent treatment of the tar to effect their return to the gas. It is gradually becoming recognized that cooling is not the only agency by which tar can be separated from crude gas; but, on the contrary, cooling alone is not altogether efficient. I look upon it as quite within the bounds of possibility that by the employment of large vessels in which the reduced velocity of the gas would allow time for the heavier particles of tar to settle, and by the subsequent use of some system of straining through a series of sieves of coarse wire gauze, the tar will be completely separated, at the same time that the temperature of the gas will be maintained sufficiently high to permit of the almost complete retention of light hydrocarbons. A similar process has already been recommended by Mr. Aitken, and if any mechanical system could be introduced for the separation of tar on the basis indicated, it would, I believe, be far more perfect than the present method, and altogether more desirable for the purpose of retaining the light hydrocarbons in the gas.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE AMALGAMATION OF THE SOUTH LONDON GAS COMPANIES.

Sir,—The Chairman of the South Metropolitan Gas Company stated, at the meeting of Shareholders held on the 25th ult., that the "B" shares, representing the late Phœnix Company's stock, would for the current half year be entitled to a dividend at the rate of 11½ per cent. per annum, and in effect he also stated that this dividend would, in all probability, be fairly earned. Such a statement must, as you express it in the leading article of your issue of the 31st ult., "strike the Shareholders of the London Company with all the force of a painful contrast;" and, as briefly as I can, I propose in this letter to show what, in round figures, it really means.

The ordinary stock of the London Gas Company on the 31st of December last amounted to £389,800, upon which 1¼ per cent. per annum would be £4872 10s. This sum, therefore, is at present annually being lost by the Proprietors, and represents, capitalized at 25 years purchase, a value which, in case of transfer of their property, they would become entitled to receive of £121,812 10s.—sufficiently respectable amounts, both annually and as capitalized, to merit the serious consideration of those immediately concerned.

The only possible defence of the London Board in excusing the policy which has led to this result, and of the inaction which still protracts the period when it may be remedied, is the doubt which may possibly be entertained as to the continuance of the increased dividend with a reduced price of gas. The Board may not consider it necessary thus to defend themselves, but as this is really the eventuality which, in an indefinite shape, is being feared, the probability is worth examination. Assuming that a proposal were made that the London Gas Company's stock should become merged in that of the South Metropolitan, under similar conditions to those of the late Phœnix Company, the first question which would have to be satisfactorily answered would be the possible amount of reduction in the price of gas taken together with the correspondingly enhanced dividend. The reduction in the price of gas would have to be 3d. per 1000 cubic feet to assimilate with the all-round price now ruling in the South Metropolitan district, and the revenue would be affected, as per the quantity of gas sold by meter for the half year ending the 31st of December last, by £8363. The increased dividend on the ordinary stock as at same date would amount to £2436, and the total for the half year would be £10,799.

It is improbable that the Shareholders of the South Metropolitan Company, as now constituted, would consent to amalgamate with the London Company upon terms which would entail a sacrifice upon themselves, and it may therefore be assumed that, under the very best conditions which the London Company could obtain, it would be necessary to be able to show that without such sacrifice a sufficient saving could be effected. Let us examine where this may reasonably be anticipated.

The first reserve to count upon would naturally be the excess profits actually shown by the last balance-sheet of the London Company. This apparently amounted to only £2511, but in connection with this sum we have to consider the expenditure which affects such balance. The expenditure of the London Company for the year 1879 is shown, by the analysis of the Metropolis Gas Companies accounts just published in the Journal, to have been 30s. 11·19d. per ton of coal carbonized, as against 27s. 5·42d. of the South Metropolitan Company; and even allowing these latter expenses to have become slightly increased (which is scarcely probable) by amalgamation with the Phœnix Company, a difference of quite 3s. per ton might still, I think, be calculated upon. This alone would amount to £10,732 for the half year. These items, by themselves, would be more than sufficient to meet the *per contra* already noted; but there are other sources of economy which may at once be counted upon to come into action. Increased consumption of gas would be one of, if not the chief of these, and it is obvious that the district lighted by the London Company will compare favourably in this respect with that of any of the other Metropolitan Companies.

This letter is based upon a possible 1¼ per cent. increase of dividend; but it is very evident that, without being over-sanguine, *more* may be reasonably hoped for. The Governor of the Chartered Company, at the recent meeting of Shareholders, gave a few figures bearing upon this. For instance, he stated that bonds in perpetuity were now saleable at a saving of ¾ per cent. upon former rates, and that, as compared with the corresponding period of 1879, the tar had realized a much higher price per gallon. The first of these items would effect a saving on the loan capital account of the London Company, and the latter would represent increased revenue to the extent of several thousand pounds per annum. In the full manufacture of the tar and ammonia products, however, there is a great future of increased revenue for all large gas companies, and taking this prospect in combination with probable economies in the direct manufacture, it would be somewhat bold to predict exactly the minimum to which, with corresponding increase of profits, the price of gas may be reduced; but I think I have said enough to show that no reasonable fears need be entertained as to an 11¼ per cent. dividend being possible to the Shareholders of the London Company, should amalgamation upon fair terms with the South Metropolitan Company be effected.

VIGILANS.

Sept. 9, 1880.

MR. METHVEN'S LIGHT UNIT.

Sir,—In the last number of the Journal there appeared a summary of the proceedings at the meeting of the German Association of Gas and Water Works Engineers, in which summary it is stated that the Photometric Committee of the Association, with Dr. Rüdorff in concurrence, reported adversely to Methven's unit or standard photometric light, in the following terms:—"The Methven unit is more liable to variation than the candle, so that nothing would be gained by its adoption."

With all possible respect to the Photometric Committee, and to Dr. Rüdorff as its head, I must in positive terms deny the correctness of the conclusion arrived at, even if sperm candles vastly superior to those which we can obtain in England were used in the comparative experiments. I trust I am not disposed to be dogmatic in matters of science, as I generally submit myself respectfully to its professors; but in the matter of practical photometry I think the experience of nearly thirty years devoted to its theory and practice entitle my results to an exhaustive examination by the most skilful scientific photometrists before they are negatived or set aside. Such examination I invite from the German Association.

I have made many hundreds of experiments with the Methven standard, all of which were conducted with the utmost possible care and precision. I am now engaged upon another series, the results of which, when completed, I hope presently to publish. All my experiments show conclusively that the value of the "standard" to an investigator is immense; for comparative experiments, which with candles would demand an hour's time and work, can with the "standard" be readily completed within a few minutes, and with a concordance in results which is alike satisfactory and delightful. It affords me much pleasure to say that Mr. Greville Williams, F.R.S., who has had great experience with the Methven standard, has repeatedly expressed to me his gratification at the extreme regularity of the results which he has obtained with it.

I shall send a copy of this letter to the Secretary of the German Association, accompanied by an offer to present them with a Methven standard on condition that it shall be tried in accordance with my printed instructions, and a report of the results which may be obtained be furnished to me. If any member of the Association should happen to be in England, it will afford me the greatest pleasure to give him an experimental proof of the rigorous accuracy of all my assertions respecting the instrument.

F. W. HARTLEY.

55, *Millbank Street, S.W., Sept.* 9, 1880.

Bromley Gas Consumers Company.—The half-yearly general meeting of this Company was held on the 24th ult.—Mr. B. Latter in the chair. The Directors report, which was presented, stated that the make of gas had become almost stationary during the last half year, the total increase being only 1 million cubic feet, or about 2¾ per cent., instead of the previous average rate of about 14 per cent. The balance of the profit and loss account, available for dividend, was £3224 2s. 5d., which would not suffice to pay the maximum half-yearly dividend on the two classes of shares, and the Directors recommended that the dividend should be at the rate of 9 per cent. per annum on the ordinary 10 per cent. shares, and 6¼ per cent. per annum on the ordinary 7 per cent. shares. This would leave about £160 to be carried forward to the next half-yearly account. Nearly £4000 of capital had been expended during the past half year in enlarging mains and completing the works, and with the exception of the railway siding, the Directors did not anticipate any very heavy further outlay. The report was unanimously agreed to.

Brymbo Water Company.—The twenty-second annual general meeting of this Company was held on the 27th ult., when the Directors report and the accounts of the Company for the year ending June 30 last were presented. The former stated that the domestic rates for water showed an increase of £32 on those of the previous year. There had been 178 additional houses connected to the Company's mains, making the total number 2006. After paying working expenses, and an interim dividend of 5 per cent. per annum for the half year ending December last, there remained a balance of £778. The Directors recommended the declaration of a dividend for the second half year of 6 per cent. per annum, carrying forward £178. The Company's capital, share and loan, is £21,450, the whole of which, with the exception of a small balance, has been expended. The revenue account showed receipts to the amount of £2019, against £1624 in the year ending June, 1879; the expenditure being £684 this year against £622 last. The balance carried to net revenue account in 1879 was £1002; this year it is £1334, being an increase of £332.

Morecambe Gas Company.—The annual general meeting of the above Company was held on Tuesday, the 31st ult.—Mr. W. Roper in the chair. The Directors report, which was taken as read, stated that the net profit for the year amounted to £918 11s. 2d., which, with the balance from last year, £383 12s. 10d., made a total of £1302 4s. available for dividend. This enabled the Directors to recommend a dividend of £6 per cent., free of income-tax, for the year, £4 of which was paid on the 1st of March last, and to carry forward a sum of £373 19s. 2d. to next year's account. At the commencement of the year a reduction of 5d. per 1000 cubic feet was made in the price of gas, the charge being 5s. per 1000 cubic feet. The Chairman, in moving the adoption of the report, said the Company had not had so successful a year as the Directors could have wished; they had now, however, better materials, and were likely in the future to effect a great saving in the manufacture of gas. The report was adopted, and the thanks of the meeting having been accorded to the Directors and Manager, the proceedings terminated.

Miscellaneous News.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

(*Concluded from p.* 382.)

Mr. C. EASTWOOD (Batley) read the following paper on

COAL SEAMS:

THEIR STRATIFICATION; AND THE GAS-PRODUCING QUALITIES OF THEIR DIFFERENT SECTIONS.

The mining engineer has proved the existence of many individual seams of coal; the chemist and geologist conjointly have endeavoured to explain when, where, how, and of what they have been formed; and the gas engineer has found that the whole of those seams vary in their gas-producing qualities, and consequent value to him. I wish to-day to show you that the coal in many of those individual seams exists in a stratified condition; that it consists of horizontal layers or sections in the line of its stratification; and that each of those layers or sections varies, almost uniformly, in the quantity and quality of the gas produced from them. In order that you may at once perceive more fully the object, nature, and extent of my investigations and experiments, I will explain the circumstances which led to them.

Prior to 1877 I had been accustomed to determine by a laboratory analysis the relative values of the various coals offered to me, and had been frequently surprised at the different results obtained at different times from the same seam of coal, quite as much as some of the critics amongst ourselves are surprised at the different results obtained by various experts from the same seam of coal; and was just as unable as they to give a satisfactory explanation of the circumstance. But I knew I had confidence in the honesty of their attainment; I had sought neither to flatter nor to favour any one, because up to the present moment, with one exception, I have not given any contractor the result of any experiments, and that exception was in vindication of my action in countermanding a contract which had been entered into from reports which were not afterwards substantiated by my own experiments, &c. My experiments, you will thus see, were made for my own information, and I knew that, however much the results might vary, they represented the value of each sample of coal, *plus* any imperfections or variations in the method of conducting the respective analyses. Yet such were their variations, which at that time I thought were due to the small quantity of coal used (56 lbs.), and to the more or less fairness in selecting it, that I determined to submit the whole of the coal offered to me to a working analysis of not less than 24 hours duration, in order that I might not only obtain data upon which to estimate their respective values, but also that I might approximately estimate the quantity of gas that should be produced per ton of coal carbonized each week, from the known quantity of each class of coal used. For this purpose I had every part of the apparatus carefully examined, and the purifiers so charged that there might be no changing of them during the experiments, which were made during the summer-time with coal specially supplied for the purpose.

It is unnecessary for me here to give you the results; suffice it to say that, guided by them, we made our purchases and all went on well up to the commencement of the winter season, when my make of gas per ton gradually decreased each week. I, of course, blamed the men, and charged the foreman to see that everything was properly attended to, but without any improvement. I therefore gave the subject my personal attention, and spent almost day and night in the retort-house; but, beyond rectifying some slight defects and finding out a few other long standing, but for the time being irremediable ones, I made no satisfactory improvement. I had, however, observed certain peculiarities in the character of some of the coals delivered thus constantly before me, which induced me to re-test them. This I did in such a manner that the coal contractors were not aware of what I was doing. The result showed that whilst one sample exceeded the standard and another came fairly up to it, others fell far below it, in one instance of 1620, another 770, and another 758 cubic feet per ton. The latter were from local pits, and I had thus the fullest opportunity for watching the character of coal delivered daily; and such was the nature of the observations, that I made an unexpected visit to one of the contractors pits, where I beheld a somewhat Darwinian system of "the selection of the fittest" in full operation; for the coal was being sent out of the workings more or less selected, and a certain kind was loaded for the gas-works, and another kind was loaded for household purposes. I also noticed that although they sometimes put some of the gas coal amongst the house coal, they did not put any of the house coal amongst the gas coal; and when I asked the banksman why they did not do so, he informed me that anything was good enough for gas coal. I thus saw at least one cause which might tend to decrease my make of gas per ton; but before making any formal complaint, I wished to inspect the seam of coal as it lay undisturbed in its natural bed. This I did, in company with the manager of the pit, and spent many hours looking through the extensive workings. I saw that the seam presented three separate and distinct sections or classes of coal in the line of its stratifications; and also the facility with which in its fall the upper section—about 1 foot thick—split freely off from the remainder, which was about 16 inches thick. The upper section was picked up by the men and sent out separately, and corresponded with the kind of coal I had previously seen loaded for household purposes; and I afterwards found out that the men were paid a little extra for this selection. The remainder of the coal was then gathered up and sent out, either for gas or engine coal. If for gas coal it was riddled; if as engine coal it was not screened. It now only remained for me to have samples of each section supplied, in order that I might make laboratory analyses to determine their relative value.

Before proceeding to give you the results of experiments, I think it necessary to inform you that in all my laboratory analyses the weight of coal used was 56 lbs. The ascension-pipe had ¼-inch dip; but the weight of the gasholder, having a capacity of 400 cubic feet, gave a pressure of 1½ inches upon the retort. The gas was cooled by passing upwards through a 2-inch worm condenser into a settling chamber, and was purified with oxide of iron only to enable me to make volumetrical analyses of the impurities not removed by the oxide. The illuminating power was ascertained with one Sugg and Evans's photometers.

The following are the results of my laboratory analyses of some selected samples, to show the different results obtained from the sections into which the Haigh Moor seam is divided in the line of its stratification:—

	Tops.	Middles.	Bottoms.
Weight of coal analyzed, lbs.	56	56	56
Gas made per ton of coal, cubic feet	10,440	9520	9000
Illuminating power, standard candles	16·88	16·48	15·86
Value of coal per ton, lbs. of sperm	615	538	508

These results, corroborated by many subsequent experiments, proved the superiority of the upper section as a gas-producing coal; and confirmed the opinion previously formed respecting the cause of the discrepancy between past and present results. The former were obtained from a sample of coal sent during the summer time, when there was little demand for house coal; the latter were obtained from a sample unexpectedly taken during the winter season, when there was a demand for house coal; in consequence of which the upper section was not sent for gas coal.

Guided by this experience, I extended my inquiries into the character of every seam of coal from which I then, or have since, obtained my supply, with the following results:—

—	Weight analyzed.	Gas made per Ton.	Illuminating Power.	Value of Coal per Ton.
	lbs.	Cubic Feet.	Standard Candles.	lbs. of Sperm.
Little Middleton Seam . . Tops.	56	11,920	14·75	602·81
" " . . Middles.	56	11,200	16·37	628·66
" " . . Bottoms	56	9,000	17·17	529·81
Middleton Main Seam . . Tops.	56	12,140	16·10	670·11
" " . . Middles.	56	10,467	16·21	581·90
" " . . Bottoms	Only sent	out as	engine	coal.
Middleton Main Seam . . Tops.	56	11,920	15·97	663·66
" " . . Middles.	56	10,560	17·88	619·00
Middleton Main Seam . . Tops.	56	10,680	18·55	679·94
" " . . Middles.	56	11,840*	16·54	671·43
" " . . Bottoms	Not got, be	cause of the	depth of the	parting.
Flockton Seam . . . . Tops.	Not got, be	cause of the	depth of the	parting.
" . . . . Middles.	56	11,820	15·64	604·86
" . . . . Bottoms	56	9,400	17·16	533·04
Flockton Seam . . . . Tops.	Not got, be	cause of the	depth of the	parting.
" . . . . Middles.	56	11,440	14·00	549·00
" . . . . Bottoms	56	9,920	13·50	459·00
Haigh Moor Seam . . . Middles.	56	11,840	13·31	540·30
" " . . . . Bottoms	56	10,800	13·30	492·48
Admalton Black Bed Seam† Tops.	56	12,200	15·37	642·90
" " Middles and Bottoms	56	9,800	15·57	523·15
Brown Metal Seam‡ . . . Tops.	56	10,600	15·71	570·90
" " Middles and Bottoms	56	9,360	16·40	526·30

* This is the only instance where I have found the middle section yielding a larger quantity of gas than the upper. This is entirely due to the excessive amount of hard-band coal found in the upper section, and which is hereafter referred to.

† Additional particulars: Weight of coke per ton of coal—tops, 1360 lbs.; middles and bottoms, 1440 lbs. Weight of tar and liquor per ton of coal—tops, 240 lbs.; middles and bottoms, 290.

‡ Additional particulars: Weight of coke per ton of coal—tops, 1520 lbs.; middles and bottoms, 1560 lbs. Weight of tar and liquor per ton of coal—tops, 360 lbs.; middles and bottoms, 320 lbs. Sulphur per 100 cubic feet "Harcourt's test"—tops, 46 grains; middles and bottoms, 92 grains.

The following are laboratory analyses of the Black Bed seam of coal, as supplied from Conyer's Colliery at Dewsbury Moor, showing the results obtained at different periods from this seam, which does not contain the before-mentioned distinctive stratifications and sections clearly defined:—

Date of Analysis.	Borrowed Analysis.	1875. June 26.	1876. July 11.	1877. June 21.	1878. March 25.	1880. Feb. 5.
Weight of coal analyzed, lbs.	Not stated.	56	56	56	56	56
Gas made per ton of coal, cubic feet	12,900	11,803	10,600	11,720	11,640	11,280
Illuminating power, standard candles	15·47	16·40	15·75	17·15	16·84	15·71
Value of coal per ton in lbs. of sperm	684·21	663·49	572·40	672·40	672·04	607 71

Note.—I frequently find in this seam a band of cannel varying in thickness from 1 to 4 inches, but it is not uniformly present.

These experiments, frequently corroborated by subsequent ones, unquestionably prove that these horizontal sections uniformly vary in the quantity and quality of the gas produced from them; showing that the results obtained in my former experiments with the different sections of the Haigh Moor seam, were somewhat similar to those obtained from five other individual seams, and that the Haigh Moor seam was not isolated in its peculiarities.

The Haigh Moor seam crops out at Batley, and dips towards the south-east in the direction of Wakefield, where it attains a depth of over 400 feet, and varies in quality with its depth from the surface. The partings between the sections are quite distinct, and notwithstanding the existence of numerous faults, they, as well as the thickness and character of the sections, are uniform throughout. The upper section is more compact and cohesive than the middle, and the middle much more so than the lower. From this circumstance—which influences the size of the cubes when the coal from each section is broken—each section may be recognized on the pit bank. It is chiefly because of this that the upper section of almost every seam is selected for household purposes, as, from the facility with which it is separated by the parting, and the cohesiveness of the coal, this is easily done. The partings vary in their composition in various seams, but are quite distinct from the thin deposit of mineral charcoal present in almost every piece of black coal. These are chiefly of a clayey composition, and have frequent deposits of mineral impurities.

Respecting the Flockton seam, I may observe that the outcrop is at Batley with a south-easterly dip. At Batley and Dewsbury the upper section is separated from the lower ones by a stratum of strong bind, varying in thickness in the direction of the dip, with a fairly continuous band of ironstone about 2 inches thick. When inspecting this seam at the Ridings Colliery at Dewsbury, I had the advantage of passing along the main road for about 1½ miles in the direction of the dip, and noticing the contour of this intervening stratum—which at the outcrop was thin, but increased in thickness with the distance I went—it appeared to me that the lower sections had been formed in a slowly sloping valley or basin, which had been subsequently filled with water, thus forming an inland lake, into which the clay and sand of neighbouring hills have been carried by streams and deposited, thus filling up the lake and leaving a level surface, upon which the upper section had been formed. Throughout this section or stratum of strong bind no marine fossils are found, indicating its fresh-water formation; but in the roof, above the upper section, there is an abundance of marine fossils. In consequence of this deep parting, the upper section is not obtainable, and I have been unable to get samples even for analysis.

Respecting the lower sections of the seam, I may state that here the partings are thin and frequently indistinct, until the coal is being "wedged off," when it is seen to be continuous. I had no difficulty in finding the parting, where it was thin, with the aid of a crooked instrument similar to that made use of to remove the wire from the corks of soda-water bottles. The substance extracted was clayey, and when moistened was plastic, the thinness of the parting being probably due to

erosion. The character of this seam of coal at Batley and Dewbury is very different in its cohesiveness. Between the two places there is a great fault; and at Batley, in consequence of the nature of the roof and its depth from the surface, the coal after a storm of rain is as wet as if dipped in the sea. I have in consequence had frequently to suspend the delivery of coal; but when it is obtained dry it is a good coal.

The Middleton Main and the Middleton Little seam, although varying considerably in different districts in its quality, and the nature and depth of its partings, in consequence of numerous faults, presents as clear an illustration of this distinct stratification in our coal seams. Like the Haigh Moor there is no mistaking them. The bottom section wherever found is an inferior coal; and I have already shown you that the Lofthouse Colliery Company candidly acknowledge the fact, by declining to send it out except as common engine coal. I wish all colliery owners were of the same opinion, and as honestly carried it out in practice.

The middle section I find to be a good gas coal which produces a good coke, and can be and is supplied separately. The upper section varies considerably. I find in it a stratum of hard-band coal, varying in thickness and density. It is hard, compact, and foliated; splitting into longitudinal plates in the line of its stratification. Its cross vertical fracture is splintry and angular. The coal is coarse in the grain, presenting a grey-black mass, with thin streaks of bright coal. When finely powdered and placed under a microscope, it exhibits its earthy composition; it ignites with difficulty; the coke frequently retains the structure of the coal, and requires the draught of a blast furnace for its combustion. A stranger with a piece of this coal in one hand, and Mr. Paterson's "Lithology of Gas Coals" in the other, would at once condemn it.

With the exception of this hard band-coal, made solely on account of the character of its coke, the upper section is a good gas coal, and such is its similarity to the middle section, at the Soothill Wood pit, that but for other instances proving otherwise I should have regarded them as being of the same formation. The depth and character of the parting between the middle and bottom sections of this seam vary considerably; in some instances the parting is thin, and the bottom section is obtained; but at the Soothill Wood Colliery it is from 2 ft. 9 in. to 3 ft. thick, and consists of spavin or strong bind, with no marine fossils, and in consequence of this the bottom section is not worked—a circumstance worth knowing by any one using this seam for gas-making. You will see from my analyses that I have found one seam in my neighbourhood which does not present these distinctive sections clearly traced by a parting of shale or strong bind. It has the appearance of being a single formation, differing chiefly in the cohesiveness of the coal from the top downwards. I refer to the Black Bed seam; but its character is not uniform. I have used this coal for six years, and consider it the best that I am acquainted with for making gas and coke. Generally speaking, it breaks up cubically in all directions, presenting clean black velvety surfaces, which, when abraded, exhibit a rich brown shade of colour, and when finely powdered and placed under a microscope it retains its appearance. In my examination of the seam at Dewsbury Moor, I found in one part of the pit a kind of cannel, varying in thickness from 1 to 4 inches at the bottom part of the coal; but it is not uniformly present. When it is present, however, the entire seam is not so cohesive as where it is not present. Between the two places there is a slight fault, parallel with the main fault, and this fault changes the character of the coal. Some days the coal I receive contains this cannel, and on other days, and even on the same day, there is no cannel present. This is entirely due to the different parts of working from which the coal is obtained.

From the fact that this seam appears to be a single formation, and the general friableness of the entire seam rendering it difficult to obtain sections, and also because the coal is not suitable for household purposes, I have not made sectional analyses. Yet the analyses I have given you vary. The samples were taken unselected from coal as usually delivered. These variations present themselves in my working analyses, as shown in the following instances, and are due to the presence of this band of cannel. I will also give you some comparative results from coal from this seam, obtained from pits widely separated from each other, and between which there are numerous faults. These will show the character of the entire seam.

Analyses of Black Bed Seam of Coal.

Date of Analysis.	May, 1878.	June, 1878.	July, 1878.	July, 1879.
Weight of coal analyzed, tons	65	59	62	29
Gas made per ton of coal, cubic feet	9,635	10,271	9,816	10,200
Illuminating power, standard candles	17·64	17·24	17·32	16·82
Value of coal per ton in lbs. of sperm	568·44	607·10	582·90	588·22

Laboratory Analyses, showing the Comparative Results obtained from the Black Bed Seam of Coal, from Different Pits, at Considerable Distances from each other at the same Period.

——	1877.				
	Howden Clough Colliery Company.	Liversedge Colliery Company.	Haighs of Dewsbury Moor.	Mirfield Colliery Company.	Broadbent and Johnson.
Weight of coal analyzed, lbs.	56	56	56	56	56
Gas made per ton, cubic feet.	12,160	13,680	11,720	11,200	11,460
Illumin. power, standard candles	14·84	14·43	17·15	15·92	15·94
Value of coal per ton, lbs. sperm	618·70	676·80	672·40	611·30	626·30
Weight of coke p. ton of coal, lbs.	1520	1480	1600	1600	1600
Tar and liquor p. ton of coal, lbs.	300	160	320	220	260
Sulphur per 100 cubic feet, by "Harcourt's test," grains.	40	25	26	45	125

I have also found, as shown in the following working experiments, that the results obtained from coal supplied in vertical section from different parts of the same seam to vary considerably—the shaft was not deep, though the workings were extensive—partly in consequence of numerous open faults, the proximity to the outcrop, and the action of air and moisture upon its extensive surfaces. The effect of the two latter you will appreciate, from your knowledge of the extent to which coal becomes anthracitic when stacked in your yards for any length of time.

Working Analyses, showing the Results obtained from Flocton Coal selected from different Parts of the same Seam, and specially supplied for the purpose.

——	No. 1.	No. 2.	No. 3.	No. 4.
Weight of coal analyzed, tons	7	9	10	8
Gas made per ton of coal, cubic feet	11,250	10,506	9,875	8,875
Illuminating power, standard candles	15·96	16·12	14·90	16·26
Value of coal per ton, lbs. of sperm	615·60	580·32	504·17	494·77

I have avoided giving any geological reasons for considering that the formations of these different sections in a seam of coal are separate and distinct, preferring, for practical purposes, to deal with the unquestionable fact that they are there, however formed. I may state that with this knowledge and these results before me I am unable to agree with a very eminent authority, when he states, in reference to the variation of the quality of the coal itself, that "he ventures to express a doubt whether the discrepancy between the commercial value and practical results is alone due to this cause; and that his experience leads to the opinion that the alterations in the physical conditions of a seam form *one only, and that probably the least important of a series of causes* which operate to reduce both quantity and quality of gas on a larger scale." (*Vide* JOURNAL OF GAS LIGHTING, June 17, 1879.)

My experience leads to a different conclusion. I had, you see, in 1877, long before the publication of that letter, with its attendant correspondence, established the fact that some seams of coal do uniformly present, in the line of their stratification, distinct strata or sections, varying widely in the quantity and quality of the gas produced from them; and that those variations were not accidental, but from physical causes constant and inevitable. This leads me to the conclusion that their existence was the *most important of any cause, of the different results obtained both in the laboratory and on a larger scale*; and I have given practical effect to that opinion, by inserting the following clause in all my contracts and advertisements for coal since 1877:—"On no account will the contractor be permitted to select or reserve the best part of the coal obtained from his pit for household purposes, and deliver the remainder as part of this contract."

Upon this subject I admit of no "ifs" nor "buts"—the facts are clear. I have no pet theory to protect by not acting upon them; and if it is a truism that our profits are made in the retort-house, and as coal *is* the source whence it is derived, too much care cannot be exercised in the selection of it, and obtaining what you pay for.

Permit me now to make a few remarks in reference to the discrepancies which frequently present themselves in the analyses made by different experts from the same seam of coal. Much discussion and correspondence has taken place respecting them, but I hope that all our criticisms may be kept within the bounds of that moderation due to gentlemen who generously give us the results of their researches in a subject which admits of no finality. I take it as a *sine quâ non*, that they have and can have no other object in view in their communications than the diffusion of useful information, and the correction of erroneous opinions formed, possibly, from an imperfect acquaintance with the subject. From the experiments narrated in my paper you may see that I am prepared to expect that those differences will present themselves, and I should be surprised if they did not, as witness the following comparative analyses of gas coals, showing the different results obtained by different experts from the same seam of coal:—

Silkstone Seam, Barnsley.	No. 1.	No. 2.	No. 3.	No. 4.
Gas made per ton of coal, cubic feet	13,600	12,240	11,250	10,250
Illuminating power, standard candles.	15·30	16·66	16·40	17·00
Value of coal per ton, in lbs. of sperm.	742·00	699·00	632·60	597·30

Black Bed Seam.	No. 1.	No. 2.	No. 3.	—
Gas made per ton of coal, cubic feet	12,600	12,640	11,584	—
Illuminating power, standard candles.	16·67	14·35	18·76	—
Value of coal per ton, in lbs. of sperm.	720·00	636·17	745·10	—

These comparative statements show great variations, but no greater than I have found and constantly obtain from the same seam of coal. Therefore too much caution cannot be exercised before giving a condemnatory opinion of them. They were made by able and experienced experts, who, much as they value the good opinion of others, value yet more highly the approval of a good conscience. Without a doubt their results express the value of the particular sample of coal supplied to them, although, from circumstances to which I have referred, their deductions from them, respecting the character of the seam in general, may be unsound. The method observed in their analyses may vary, the efficiency of their apparatus may vary, the skill of the experts may vary, and above and beyond all the sample of coal may—nay, must vary. A more thorough knowledge of the seams of coal referred to will tend to modify if not remove those discrepancies which, instead of being the cause of complaint, should be regarded as pointing out the existence of these distinctive sections and peculiarities in the seam. They are the light-buoys on the sea of experiment—warning you of dangers ahead.

I may conclude by remarking that faults and failures you may find in my experiments. They were made, most of them, many years ago, not for publication, but for my private information, to clear up a difficulty which had presented itself in the ordinary course of business, and I thought that, under present circumstances, the narration of them might prove interesting to you; for experience has shown that even the record of a failure has proved the stepping-stone to a more important success even in another direction. But I may, in attempting to point out the stratification of our coal seams with the different sections varying in the quantity and quality of gas produced from them, have added but another to the multitude of obsolete ideas encumbering the paths of Science. I have done what lay in my power briefly and clearly to state the facts presented to me. You now make your calculations, and time, the detector of all human error, will prove their correctness.

Discussion.

The PRESIDENT said he was very pleased that Mr. Eastwood had gone so fully and so thoroughly into this subject. He thought the paper, valuable as it was as it had been read over, would be much more so when it was printed, and the members had it before them, because it was quite impossible to follow a series of elaborate tables, and have a very clear idea of what they meant, when they were simply read over; and it was equally difficult for Mr. Eastwood to make them interesting. He thought the members would all agree as to the value of the paper.

Mr. CLARKE (Ashton-under-Lyne) was very much pleased with the paper, which he thought had given the members an insight into many things about which they might not have been very clear before. His experience had frequently been that while working with one class of coal there had been days and days together when the production had been different to what it was at other times, and, as Mr. Eastwood said, he had often gone to the foreman, and persisted that there must be some neglect—either that sufficient material was not used, or some other cause was at work to make the difference. He had on such occasions searched the place from end to end, without finding anything to account for the falling-off in the production, and in a day or two things had righted themselves. Mr. Eastwood's paper had clearly shown him that the difficulty must have arisen through the variation in the quality of the coal, although it was of the same class. He did not exactly understand what Mr. Eastwood meant by "tops," "middles," and "bottoms." Were there three seams of coal?

Mr. EASTWOOD: No; they are different sections of the same seam, sepa-

rated by distinct partings, which are sometimes an inch, and sometimes as much as five inches thick.

Mr. CLARKE remarked that if there was this wide difference between the "tops," "middles," and "bottoms" of the same seams, a strict watch ought to be kept on the coal supplied. He considered the paper a very useful one.

Mr. COLES (Todmorden) said the reader of the paper spoke about the men not doing their duty, and the necessity of looking after them very carefully. Of course that was a very important thing. Then as to quality of the coal; the quality stipulated for could not always be delivered in bulk. Mr. Eastwood had told them that, experimenting with 56 lbs. of coal, he found that it yielded at the rate of 11,850 cubic feet of gas to the ton. Would it be pure coal?

Mr. EASTWOOD said he had stated most distinctly that he had specially selected each sample.

Mr. BRYAN wished to know whether Mr. Eastwood found this great variation in nuts.

Mr. JONES (Chesterfield) said the paper was something out of the usual run of papers which they heard at meetings like this, and he was very pleased indeed that Mr. Eastwood had taken up a subject of so much importance, and handled it in such a workmanlike manner. There could be no doubt that much of the variation in the quality of gas was due to the difference in the quality of coal, and to the fact that the merchants had been in the habit of dividing their coal. He was very glad that a gentleman in their own profession had turned his attention to the subject, and had succeeded in discovering the cause of much anxiety to gas engineers in general. He was, however, rather surprised to find that "middles" did not come out so well as he had expected. He could quite understand that in the coal formation the *débris* of the forests would get mixed up with the mineral matter of the bed, and that the coal would be inferior at the bottom; but he fully expected to find that "middles" would be better than "tops"—to use Mr. Eastwood's expressive phrases. He had with him a complete sectional drawing of the Yorkshire coal-field, and he looked through it as his friend was talking, but could not very clearly follow him. The worst of it was the various seams of coal were known by local names, so that there was very great difficulty in knowing which was which when they came to compare. The Flockton seam was not a very important one in the Yorkshire coal-field. He should like to hear Mr. Hutchinson on the Barnsley bed, and should also be glad if Mr. Eastwood would kindly tell them which he considered the best gas-producing coal in the Yorkshire field. The section which he had was clearly drawn on a very exact scale, and the foreign matter between the various beds of coal, sometimes dividing them a quarter of an inch and sometimes two or three inches, was distinctly marked. He had also a section of the Derbyshire coal-field, and he might say that he thought a good deal of useful information could be elicited from these various sections. The subject of coal was certainly one of the most important that could come under the notice of gas engineers, and a full consideration of it, in relation to its quality and in all its bearings upon the gas industry, certainly could not be a waste of time on the part of an association like this. He was not surprised, as he had already said, that coal from the same bed should vary in quality. He had known cases in which coal taken from the same bed, but at points a few yards asunder, had differed very remarkably indeed. He rather took exception to one thing which Mr. Eastwood did. He said he took only 56 lbs. of coal for testing purposes, and if he had not qualified that statement by saying that he took the mean of eight tests, he (Mr. Jones) should have said he considered that a very small quantity. For his own part he liked to take at least half a ton of coal for experiments of this kind. There were many collieries where the entire seam was worked, and the coal put all together, and sold as gas coal; but this did not apply in the case of other collieries, where the best coal was disposed of for house purposes, and the rest was sent to the poor gas manager. During the coal famine they paid 25s. a ton at Chesterfield, and were glad to get almost any quality; but now the coal trade was slack they could be more particular as to the quality. Just now, however, he was using coal which, while it looked very fair upon the face of it, was producing gas which had increased the cost of purifying 170 per cent. He attributed this to the sulphur in the coal. The sulphur was, as Mr. Eastwood said, thinly laminated—spread out on the coal—and if the coal were broken into very small particles, the small fragments of pyrites could be seen with the aid of a microscope. Such coal as this was not at all suitable for gas-making, and it was absurd to suppose that coalowners could clean it; but corporations and companies would contract for what they considered to be the cheapest and best article, and it very often happened that bad was the best in coal of this character. Another question he should like to ask Mr. Eastwood was whether the Flockton seam was the same as was known in Derbyshire as the thick.

Mr. EASTWOOD said it was not.

Mr. JONES said there was another cause of variation in carbonizing coal, and that was exposure to the atmosphere. Particularly was that the case with the various classes of South Yorkshire and Derbyshire coal. If they used the coal immediately it came from the pit, and carbonized it at once, the yield of gas would be 8 or 10 per cent. more than they would obtain after it had been exposed to the atmosphere for eight or ten months. Another feature he might be permitted to mention. Where the coal was near the surface it was almost sure to be so charged with sulphur and other impurities as to be nearly unworkable. The deeper the coal the better it was, provided they took a fair sample, and did not allow the merchant to select the best for house coal, and send them the rest for gas-making. He thought the drainage of mines was also an important matter, because the water percolated through the strata and deteriorated the quality of the coal. From some fiery mines he had had samples of coal which, when put under a glass, gave out gas from nearly all its pointed surface. That was particularly the case with rich bituminous coal, and this was an important reason why it should be used soon after it was obtained. He thought they ought all to insert very stringent clauses in their coal contracts, as Mr. Eastwood had done, and then the next best thing would be to get coal merchants to observe them, which he had always found a very difficult matter indeed.

Mr. NEWBIGGING congratulated Mr. Eastwood upon his research, and upon the manner in which he had presented the subject to them. Papers of this character, giving the results of one's own practical experience, were of unquestionable use to gas managers, and although it might be difficult to sit and listen to them as they were read over, yet when they were printed in the Transactions of the Institution they were of great use for reference. He, for one, was not sorry that Mr. Eastwood had confined his attention to a few coal seams. He did not think it was well for any of them to try and range over the whole field of knowledge, but they should rather confine their attention to a few subjects, and then they would be more likely to arrive at valuable results. As a matter of every-day practical experience they knew that variations occurred in the quality of coal coming professedly from the same seam, the make of gas varying as Mr. Clarke said, notwithstanding all the care that was exercised. Gas managers were also well aware of the fact that the same seam of coal varied in quality in different districts. The singularity of this circumstance had often struck him, and he had found it verified again and again. Quite recently he saw a paper which had been read before the Literary and Philosophical Society of Manchester, in which some of the causes of this phenomenon were dealt with. It was pointed out that seams of coal were materially affected by the nature of the strata which lay over them. If the strata were of an open character, such as sandstone, the gas of bituminous coal could readily escape, and leave the coal comparatively worthless; while, on the other hand, if there were a roof of almost air-tight shale, or any other material of the kind, the opposite was the effect, and the gas was retained. It was also reasonable to infer that there must be some difference in the seam of coal when it was considered that on some parts of the bed vegetable matter would be irregularly deposited. It could be quite understood that during that vast primeval vegetable growth a larger proportion of leaves would be deposited in one place than in another, while in a different place there would be an excessive deposition of bark or cellular tissue. All these would naturally tend to produce different results, and now when coal was examined these variations were found. In cannel coal there was perhaps less variation in quality than in ordinary coal. Cannel was supposed to have been formed from vegetable matter which had long been macerated in water, and one could therefore easily understand that there would be a more intimate admixture of the vegetable matter, and that a seam of cannel coal would therefore have a more uniform quality throughout its entire extent. At the same time gas managers must be careful not to make these variations in quality the scapegoat for any of their own misdeeds. He need scarcely say that they, as gas engineers and managers, must not be ready to blame the varying qualities of the seams of coal whenever the quantity or quality of the gas varied. They must be careful to look after the heat of their retorts, and to see that there was no bad management. Managers might occasionally excuse their own failings by laying the blame on the coal—he knew that there were exceptions of that kind; but let them not make the coal a scapegoat for their own carelessness in looking after their works. Let them, on the contrary, do the utmost in their power to obtain the largest quantity of gas out of the coal. At the same time there could be no doubt that a variation in the quality of the coal might be caused by its being stacked at the pit's mouth. Gas managers might have the same quality of coal, and not know that it had been stored for a long time, and the consequence would be that when they came to use it they would be disappointed in the yield of gas. The paper which had been read showed the importance of gas engineers and managers possessing a wide range of knowledge. They should not only be chemists and accountants, but if they added to their other acquirements a knowlege of practical geology, their services would be more valuable to the profession.

Mr. ASKEW wished Mr. Eastwood to tell him in what portion of the seam he found the narrow seam of cannel of which he had spoken. He (Mr. Askew) had always had the impression that coal had been subjected to great heat, and that the gas being unable to escape, cannel had been formed. If the cannel occurred in the downthrow, it would favour this idea.

Mr. ROMANS, replying to the question, said he had had a very great deal of experience with cannel, and it was always at the bottom. They had had a good deal on geology from their friend Mr. Jones, and on chemistry from Mr. Eastwood, but there was one thing practical to be said on this matter. There were certain works where really the managers could not keep testing the coal. He believed in testing with half a ton or more; he did not at all believe in such small quantities as 56 lbs. But there was this difficulty which some gas managers had—that their superiors did not like them to keep on testing. He spoke personally, from experience, and where he had been latterly engaged there was a regular time for testing. It began at a certain time, at stated intervals, and it left off at a certain time, and it was done by a chemist who, with his assistant, looked after the apparatus, and the engineer dared not touch it. The engineer merely looked on, but the coal merchant knew all about it—when it would begin and when it would end, and the whole thing was a farce from beginning to end. Every other place where he had been before the engineer kept his little apparatus, and tested the coal whenever he pleased. He kept the testing-place always in order, and he knew from experience that the moment the colliery proprietor was aware that So-and-so was a tester of coal, he took care that the house coal consumers did not carry off all the best. His opinion was that every gas manager should have the power of testing his coal, without any man's telling him when he must and when he must not do it. The manager was responsible for the works, and it was in the retort-house and not in the counting-house that the profit was made. If the engineer or manager was not to have a voice in the selection of the coal, and could not test for himself whether the quality paid for was supplied, he had no control over the result. Let them, therefore, keep on testing, and if it did cost a little money they would get it again from the coal merchant, who would take care to let them have good stuff.

Mr. HUTCHINSON (Barnsley) asked the meaning of the term "hard-band" coal; it was a term not familiar to him. As to the coal seams in the Barnsley district, there were several very good ones, but Silkstone was the best. He noticed that in one of his tables Mr. Eastwood gave, as a result supplied to him, 10,250 cubic feet of gas from a ton of Silkstone coal. He could only suppose that the person who supplied that had no stringent clauses in his agreements, like Mr. Eastwood had in his. Silkstone was a favourite term, and many colliery proprietors had adopted it, and the coal which was used in the case he was referring to could not, he should think, have come from the real Silkstone seam.

Mr. EASTWOOD, in reply, said he was very highly gratified at the amount of interest which had been manifested in his paper. In answer to Mr. Clarke, he might more fully explain that he had not dealt with different seams of coal, but with different sections of the same seams. The seam might be 2 feet or 3 feet thick, but from top to bottom it was divided by horizontal partings into three distinct bands of coal. The terms "tops," "middles," and "bottoms," were, he thought, as clear as any he could use, and they were commonly employed at the collieries in the neighbourhood of Batley. As to Mr. Coles's question, he might say he had not tested any cannel—it was all black coal. Then with regard to Mr. Bryan's inquiry, he did not use nuts at all; he had the best screened coal if he could get it. He was very glad to have had the approbation of Mr. Jones, because he was one who was thoroughly conversant with the coal question. The Flockton seam in his neighbourhood was termed the "Flockton thin;" but where the top section was found joined to the other portion, down towards Wharncliffe, it was called the "Flockton thick." This was, he believed, the only difference. Mr. Jones said he did not catch which was the best coal seam in Yorkshire. The fact was he (Mr. Eastwood) had not professed to say; he had confined his attention solely to the seams with which he was acquainted. Nevertheless, he might remark that he had found the Black Bed seam the best for producing the largest quantity of gas; but in using it care must be taken not to have the heat too high. He was sorry there seemed to be a misunderstanding as to the quantity of coal used. He said, in the first part of his paper, that he was dissatisfied with the laboratory tests, and thought the different results might have arisen through greater or less fairness in selecting the samples of coal, and for this reason he resorted to working analyses of not less than 24 hours duration, and using not less than 20 tons of coal. These bore out

his previous tests. He considered 56 lbs. of coal a fair quantity for a laboratory test, and when he constructed the apparatus he thought he had, as the President said about another apparatus, gone to the extreme. It was, at all events, a practical apparatus for the purpose, for it was not always easy to get half a ton of coal for testing purposes. Mr. Jones complained that he had confined his experiments to the Flockton seam. He thought himself that he had confined his experiments too exclusively to the Middleton Main seam, and really he had only two analyses of the Flockton seam. He agreed with Mr. Jones that the quality of the coal varied with the depth, and he had a remark to that effect in his paper.

Mr. HUNTER inquired if Mr. Eastwood meant that it improved in quality with the depth.

Mr. EASTWOOD said yes. As to the question which had been asked about cannel, it happened that in the seam he referred to, the cannel lay on the top of the fault; so that this upset Mr. Askew's theory. He fancied himself that these faults had been caused long since the coal was formed. There was one peculiarity which he noticed in the Ridings Colliery at Dewsbury, which bore out this idea. The throw was in a perpendicular direction, but the coal had been drawn over and thinned out, so to speak, without the seam being broken. As to the remarks of Mr. Romans, he always kept the "policeman" at work, and he quite agreed with what was said that if the colliery proprietor knew that frequent testings were made he was careful as to the quality of the coal supplied. The term he used, about which Mr. Hutchinson was in doubt, was "hard-band," and he applied it to a band of hard coal in the Middleton seam.

Mr. JONES remarked that his experience with reference to cannel was that it would be found in some cases in the middle of bituminous coal, in others at the top, and in others at the bottom.

Mr. EASTWOOD referred to the fact, which, he said, he had noticed, that in one portion of the Middleton Main seam, as it approached Bertenshaw, the middle section was not coal at all, but cannel.

The PRESIDENT said he had personally taken a great deal of interest in coal testing at various times, and had been very much interested in the discussion on the subject. He felt sure he should read the paper through with very considerable pleasure, when it was printed. Mr. Eastwood had made a valuable contribution not only to the proceedings of the Institution, but, generally speaking, to the literature of gas engineering, and when published the paper would, he believed, be very highly valued. He (the President) was a little at issue with the author in some matters, but he would pass them over. One question that had been asked was, which was considered the best seam of coal for gas-producing purposes. He quite agreed with Mr. Eastwood that it was a very difficult question to answer, but his experience was that of the two—Flockton and the Black Bed—Flockton was the better coal. As to the remarks about the quantity of coal used in these tests, he agreed with Mr. Eastwood that half a hundredweight was sufficient for the laboratory. They could not expect to get in ordinary working the same results that they obtained in the laboratory tests, but if they wanted to know what was the value of coal they would find it out better in the laboratory test than by any other means; therefore they must not treat the laboratory test too lightly. He used less coal than Mr. Eastwood in his experiments—only one hundredth part of a ton, in fact; but this gave gas sufficient for any experiment he wished to make, and therefore answered every requirement.

Mr. HARRISON VEEVERS (Dukinfield) read the following paper:—

ON THE "STANDARD" WASHER-SCRUBBER OF MESSRS. KIRKHAM, HULETT, AND CHANDLER.

As one of the objects of our District Associations is to discuss improvements, real or supposed, in the apparatus used in gas-works, I need not apologize for offering you a few remarks on the working of the above washer-scrubber, and giving a few results. I do this simply because I have had one at work during the past few months; and whatever apparatus had been selected by my Committee would have had similar notice. My object is to show how beneficial in every way, even in small works, is the adoption of some means of taking up the ammonia and other impurities. Members who have had experience with other scrubbers and washers will be able to compare the results of the working of their apparatus with this.

The machine at the Dukinfield Gas-Works may be described simply as consisting of seven independent hollow cylinders, the periphery of each being composed of a number of sheet-iron plates—indented and close together—so arranged that the gas entering the centre and passing outwards past the plates from each cylinder alternately comes in close contact with the water on the surface of the plates. The cylinders are in a chest partially filled with water, and are all fixed to one axle passing through their centres, and are caused to revolve four to five times a minute by a small engine. A stream of pure water enters at one end and gas at the other. The water travels from one division to another, and then flows away to the tar-well. The result of this intimate contact between gas and water is that the whole of the ammonia is dissolved, and while the water in the first division is almost pure—in fact, practically free from ammonia—the flow of water can be so regulated that any required strength of liquor can be produced in the last compartment.

As our contract for liquor did not embrace a higher strength than 6°, I found that, during the five months from the 1st of February last, to get this strength 12·05 gallons per ton of coals carbonized were required, or 1·305 gallons for each 1000 feet of gas passed through the apparatus. During the above months 3067 tons of cannel and coal were carbonized, which yielded 28,314,000 feet of gas, and the quantity of crude ammoniacal liquor registered by a liquid positive meter was 168 tons. As the yearly quantity of cannel and coal used is 8400 tons, the total quantity of liquor will be 460 tons of 6° strength—which at 25s. per ton will realize £575. The first cost of the machine without foundations, connections, or power was £430.

Previously to the adoption of this apparatus we had no means of arresting the ammonia, and commercially it was all lost to us. The purifying is also done much more economically, though I have no data to show to what extent. A pressure-gauge on the inlet and outlet does not indicate the slightest difference of pressure. The register of the liquid meter is taken twice a day, and shows that the foremen have attended to the requirements of the machine. I had, as a trial, a meter fixed on the water inlet and outlet; but, finding no difference in the quantities passed, I removed the outlet one as being more liable to get out of order.

Discussion.

Mr. CHEW (Blackpool) said he should like to know whether the gas was totally freed from ammonia by the use of the apparatus. Did Mr. Veevers test with lime, and was there any trace of ammonia?

Mr. DALGLIESH (Glossop) said he erected one of these "Standard" Washer-Scrubbers in January last, suitable for a maximum production of 300,000 cubic feet per diem, and had found it a very effective machine—removing every trace of ammonia and a large quantity of carbonic acid and sulphuretted hydrogen from the gas. It also produced from 10 to 11 gallons of ammoniacal liquor of the strength of 6° to 7° Twaddel per ton of coal and cannel carbonized; and there was a considerable saving in the purification account—£16 being saved in the lime account, and over £11 in wages for the purification of 17,958,000 cubic feet of gas. It required very little motive power, as the horizontal shaft on which the discs were keyed was only driven at the rate of six revolutions per minute, working at a minimum of pressure. It fully accomplished all the patentees stated, and was a valuable machine for the cheaper and more effectual removal of the impurities connected with gas manufacture.

Mr. BRYAN (Beverley) said he was some time ago called in to a neighbouring works to advise as to some apparatus for taking out the ammonia from the gas. He had himself one of Walker's scrubbers, and the difficulties he had had to contend with, more specially in winter, induced him to recommend the adoption of the "Standard" Washer. It was better than the ordinary tower scrubber for small works, as it was under cover, and there was therefore less difficulty in preventing the freezing of the water. There were no means that he knew of preventing the freezing of the water in the tower scrubber in the winter, and it was often a source of great annoyance. Another advantage of the "Standard" Washer was the facility with which the quantity of water passing through the machine could be regulated. In the case of the tower scrubber, one had to go up every day and turn the three taps, while with this small apparatus they could test and regulate it at all seasons. As to the result, it was perfect, if the quantity of gas was first checked. The average production of ammoniacal liquor at his own works was 21 gallons of 7° strength per ton of Silkstone coal, but he could give no statistics as to the "Standard" Washer which was erected. He agreed with previous speakers that the motive power required was very little. He fitted up a gas-engine to work the exhauster, and that engine worked this machine also.

Mr. SMEDLEY (Buxton) remarked that he had had new works erected, and he recommended to his Committee the adoption of this washer. He could not, unfortunately, say much as to the result, because the apparatus had only been in use about five weeks; but he would give them the strength of the liquor in the various compartments as tested on the previous day;—No. 1, 12°; No. 2, 8°; No. 3, 6°; No. 4, 3°; No. 5, 1°; Nos. 6 to 10, *nil*. He had, therefore, a very large margin to deal with in future extensions. There was one great advantage in adopting this washer—it could be put under cover and protected from the atmosphere day and night. He had been able, with the thermometer at 80° in the shade, to deliver his gas into the meter at 64°, and he had no part of his apparatus, except the condenser and the gasholder, which was not under cover. He simply made these remarks because he expected to obtain the same facilities in winter and summer for regulating the temperature, and also because he considered this the most effective scrubber or washer that had been invented. In the first three compartments of his apparatus he was running gas liquor, leaving the other seven for water.

Mr. JONES agreed that in order to remove the ammoniacal liquor it was necessary to have an efficient machine, but in comparing one machine with another they ought to know what quantity of ammonia existed in the gas before its removal, and this information Mr. Veevers had not been able to give them. In some cases it was almost double or treble what it was in others; but if the apparatus was removing it all, he did not think they could improve upon that. That this machine was efficient he had not the slightest doubt, but he should like to know from various speakers how many ounces of free ammonia per ton of coal they obtained from the gas. Mr. Bryan complained of the difficulty he experienced through the water freezing in winter. He (Mr. Jones) was himself sadly troubled through a similar cause some time ago, and he ran a ¾-inch gas-pipe from the boiler to the top of the scrubber, securing it to the lead pipe. He let the steam puff out at the top, and the water run out at the bottom, and if his friend Mr. Bryan would try this plan, he would have no further trouble with water freezing in the pipe.

Mr. CLAIBE (Ashton) wished to know the quantity of liquor obtained per day.

Mr. SAVILLE (Sowerby Bridge) said his idea of scrubbing and washing was that they should do as much as possible with ammoniacal liquor before they used pure water.

Mr. LAYCOCK (Keighley) had two objections to Kirkham, Hulett, and Chandler's "Standard" Washer. One was its cost, and the other the cost of the power required to work it. At the works with which he was connected there was one of Mr. G. Livesey's washers, which cost only about one-fourth of the washer Mr. Veevers had described, required no power beyond the extra pressure, and left no trace of ammonia in the gas. The apparatus described was, he believed, very efficient; but Mr. Livesey's cost less, was less trouble, was less expensive in working, and took out all the ammonia.

Mr. HUNTER (Stalybridge) was very glad to hear that Mr. Laycock could extract the whole of the ammonia with the Livesey washer; he could not do it himself. He had one in use, and it took out scarcely any ammonia, but it enabled him to dispense with about 40 tons of lime in one year, the value of which, together with the saving in wages, had nearly paid for the washer during the first year, though it certainly did not extract the whole of the ammonia.

Mr. LAYCOCK said he omitted to state that he used a scrubber after the washer.

Mr. EASTWOOD said he was thoroughly acquainted with the working of the "Standard" Washer, and perhaps if he was in want of one, and had no apparatus in use at the works, he might adopt it. He had an apparatus similar to that which they had seen that day at the Halifax Gas-Works. It had been in operation for five years, and he found it useful, because it enabled him to regulate the strength of the liquor. He bargained for 5°, and he took care the buyers had no more. All he had in connection with his machine was one pump. In three of the vertical compartments he used only ammoniacal liquor, and in the other compartment nothing but pure water. In summer or winter he could get the liquor about 5° strength, and the apparatus was so inexpensive that he thought it was the best.

Mr. COLES (Todmorden) said Mr. Anderson's rotary scrubber was something like this of Kirkham, Hulett, and Chandler, only a brush was used instead of the thin plates.

The PRESIDENT was rather surprised that they had not heard something beyond the allusion of Mr. Saville as to the advantages of using strong ammoniacal liquor as a purifying agent. He had no doubt that a large quantity of carbonic acid gas was deposited when the gas came in contact with the liquor, and that there was a great deal of advantage in washing with liquor—very much more than had appeared from the tone of that discussion. Mr. G. Livesey had stated that he found considerable advantage from it. That gentleman used, he believed, Hills's process of washing with the purifying liquor, which he thought was in itself a good thing, and would eventually lead up to something very advantageous in the way of purifying gas. The object was to purify gas in close vessels, so as to do away with the open purifiers now used, which were not only a nuisance, but were also costly from the way in which they had to be worked. Purification was a very important item in the cost of production, and the sooner they could get something to purify the gas by turning a tap, or adding a little something to the solution they had to use, the better it would be. With regard to the scrubber or washer, he agreed with Mr. Jones that it was very important to know what amount of

ammonia there was in the gas before it went into the scrubber, because different classes of coal varied considerably as to the amount of impurity they contained. At the Halifax Gas-Works there was a tower scrubber at work, and the washers which they had seen. He had tried different kinds of washers, and all sorts of experiments with them, and he found that there was a great deal in washing.

Mr. VEEVERS, in reply, said he had not been long enough at the Dukinfield works to state correctly what was the quantity of ammoniacal liquor per ton of coal before the "Standard" Washer was introduced, but the quantity in this machine was 12 gallons per ton of coal carbonized. He thought it was incorrect to say that because a still washer like Livesey's was used, therefore no power was required, because additional pressure had to be put on the exhauster to pass the gas through the washer. As he had shown, there was in this apparatus not the slightest difference in the pressure at the inlet and the outlet, and another point was that the flow of water could be regulated much better than in most washers. The object of his paper was not to show the particular merits of this machine as compared with others, but to point out to managers of small works where there was no scrubber, the advantage which this one afforded over nothing at all. This apparatus cost £500, and it had saved £570 in one year.

The discussion then closed.

Mr. T. Newbigging exhibited and explained some detail drawings of a purifying-house and purifiers constructed for the Heywood Gas Company. The house was open in front, the other three sides being enclosed by a brick wall. The building was two storeys high, and the purifiers, which were upon the upper one, were 18 feet square. Four were erected, and there was room for four more, and they were so arranged that they could be worked simultaneously or one after another.

Mr. T. G. Marsh, of Oldham, exhibited Thorp and Tasker's patent equilibrium revolving governor for lamps, &c.; and the same firm's "Æro-rheometer," for showing at a glance the amount of gas passing per hour. Both apparatus were in operation, and displayed considerable ingenuity in construction.

Mr. HUNTER moved a vote of thanks to the contributors of the various papers.

Mr. DALGLIESH seconded the motion, and it was carried with applause.

Mr. VEEVERS and Mr. EASTWOOD having acknowledged the compliment,

Mr. COLES moved, and Mr. BLACKBURN (Hebden Bridge) seconded, a vote of thanks to Mr. Newbigging, for his kindness in laying the plans of the purifying-house before the meeting. The motion was cordially adopted.

On the motion of Mr. JONES, seconded by Mr. SAVILLE, a vote of thanks was unanimously accorded to the President, and the business of the day was brought to a close.

The members and visitors afterwards dined together at the White Swan Hotel—the PRESIDENT in the chair.

After the usual loyal toasts had been duly honoured,

Mr. JONES proposed "The Mayor and Corporation of the Borough of Halifax."

Mr. CORDINGLEY responded to the toast.

Mr. WEBBER then proposed the toast of the evening—"The Manchester District Institution of Gas Engineers." He could not, he remarked, say that his knowledge of the Institution had been a very extended one, as it was only about a year since he first attended one of their meetings; but he knew them by reputation before that time, and he thought still as he thought then, that there was no district association of the kind throughout the whole of the country which did better work than this. He did not know that he need go into any great praise of them, because the papers which they read and the discussions which they held would exist, and he was sure the members would rather have the opinion of their professional brethren upon their productions than any fulsome after-dinner praises he could utter. He therefore asked them all to drink success to the Institution, and the health of the President, Mr. Carr.

The toast having been duly honoured,

The PRESIDENT, in responding, expressed his pleasure at meeting the members in Halifax, and at the fact that the gathering had been altogether a most successful one. He believed the meeting would bear comparison with any meeting they had had. The papers were of such a character that, when printed in their Transactions, the members would be able to look back to them as something to which they could refer for information. He believed it was a good thing for them to be united as they were, and meet together for the discussion of scientific subjects, and enlighten each other upon them. They were animated by no selfish opinions. They had only one purpose in view—the improvement of the manufacture of gas. All they desired was that this country should not, so far as this one special subject was concerned, be behind any other. They found sometimes that they were closely pressed by some of their continental friends in the matter of gas-making. In France, for instance, they were persevering in the matter of reducing the prime cost of the gas; but he believed that in this respect England was not behind them. In Germany, again, they found that they were pushing forward in many scientific ways, by producing new methods of heating retorts, and so on. In both those countries much good work was done through the medium of gas associations, which had a great advantage over those in England, inasmuch as they were supported by the gas companies. He wished there had been a larger representation of the Halifax Gas Committee at their meeting that day, and that their meetings generally were attended by representatives of companies and gas committees, because they would, if they listened to the discussions and the reading of the papers, give them credit for being disinterested, and for desiring to push the interest which they had at heart as much as gas engineers had.

The toasts of "The Visitors" and "The Press" having been proposed and responded to,

Mr. JONES proposed the health of the Secretary, Mr. R. Hunter, of whose services to the Institution he spoke in eulogistic terms.

Mr. HUNTER having briefly responded, other toasts followed, and an enjoyable day was brought to a close.

THORNBURY GAS COMPANY.—The half-yearly general meeting of this Company was held on the 31st ult. The accounts presented showed a large falling off in the consumption of gas, and the Directors consequently recommended a dividend of only 4 per cent. per annum on the paid-up capital. For several years past the Company have paid 5 per cent., after carrying forward a large sum to the reserve-fund account.

WISBECH GAS COMPANY.—The third ordinary general meeting of this Company was held on the 19th ult.—Mr. G. Dawburn in the chair. The Directors reported a balance available for dividend of £953 16s. 6d., out of which they recommended the payment of an interim dividend of 2s. 6d. per share, free of income-tax, being at the rate of about 8 per cent. per annum on the ordinary capital of the Company, leaving a balance of £328 16s. 6d. to be carried to the next half-yearly account. The recommendation was agreed to.

THE GAS EXHIBITS AT THE MANCHESTER INDUSTRIAL EXHIBITION.

(FROM OUR OWN CORRESPONDENT.)

One of the most important sections at the Industrial Exhibition, just opened in the large Agricultural Hall, Pomona Gardens, Manchester, is that devoted to gas apparatus, and the large number of exhibits is, no doubt, due in some measure to the fact that in this section silver medals have been offered for competition by the Gas Committee of the Manchester Corporation. Of course, it is not attempted to show the method of producing gas, nor can it be said that there is much that is really new to be seen in the application of gas. The exhibition is more an exposition of the vast variety of purposes to which gas can be applied, and especially of the great development which has taken place in its application to the purposes of cooking.

The most noticeable feature of the section is, indeed, the large array of gas-cooking apparatus. Whilst most of these are of the well-known type, there are some novelties in design and principle which may be noticed. Amongst those are Cox's patent "Save-all" gas-stoves exhibited by Messrs. Stark and Co., of Torquay, and the oxygenic cooking-stoves exhibited by Messrs. H. Green and Son, of London and Manchester. In each of these stoves a new principle has been introduced. In Cox's patent stove, ordinary fishtail burners replace those of the Bunsen type, and a couple of these are sufficient to heat a large stove, whilst no gas or products of combustion are allowed to enter the oven. The construction of the oven may be shortly described as follows:—The heat, as already intimated, is produced by one or more ordinary fishtail burners; these act in a furnace underneath the oven, which is surrounded by a small chamber into which the heated air from the furnace is passed. The cold air is driven out at an outlet-pipe, the mouth of which is below that of the inlet-pipe to the furnace, and this enables the gas-flame to burn its own products. The hot air chamber is surrounded outside by a packing of non-conducting material, and on the top of the oven are the usual burners for boiling; toasting and grilling being done by reflection.

In the oxygenic stove exhibited by Messrs. Greene and Son, who have also a large display of other gas apparatus, the heating arrangement is effected by the scientific combination of carbon, hydrogen, and oxygen, by which the combustion secured is so perfect that a chop or steak may be grilled on the oxygenic flame even better than by the use of coal. For roasting, the stoves are so arranged that a current of air is continuously passing between the fire and the joint, which is thus really roasted and not baked. These stoves are already in use at the National Training School for Cookery at South Kensington; and in connection with this exhibition, lectures are being delivered by Miss Smithard, from the above institution, on gas and its use as applied to cooking. By the aid of Messrs. Greene's stoves Miss Smithard practically demonstrates the great strides which have taken place with regard to the application of gas in this direction, and how completely all the errors of the old arrangements, which had nearly driven gas out of use as a cooking medium, have been overcome.

We may add that in connection with Messrs. Greene's stand a photometer-room, with apparatus for comparing the illuminating power and consumption of gas by various burners, and a heat-testing room for comparing the heating power, consumption of gas, and effect on the atmosphere by different gas-stoves, &c., are being fitted up, but the arrangements were not completed when our notice was written. Of these and of other exhibits, which, of course, include gas apparatus of varied descriptions, most of them, however, sufficiently well known, we must defer any further notice until we are able to give the judges awards.

EXHIBITION OF GAS APPARATUS IN DUBLIN.

An exhibition of gas apparatus, organized by the Alliance and Dublin Consumers Gas Company, was opened in the Connaught Hall of the Exhibition Palace on Monday, the 6th inst., and will remain open, day and evening, until Saturday next. The charge for admission is a merely nominal one, and the interest manifested in the display of gas-cooking apparatus has, we understand, proved to be far greater than was anticipated. All the well-known makers—Messrs. Leoni, Messrs. Wright and Co., Messrs. Billing and Co., Messrs. Curtis and Sons, Mr. C. Wilson, and Messrs. Edmundson and Co.—exhibit so many varieties of their specialities, that every requirement, from the double gas kitchener to the modest boiling and grilling stove suitable for the artizan, may be satisfied. In gas fires, Messrs. Edmundson's exhibition is marvellously tempting, as they show not only the common type of stove with copper reflector, but a large variety of asbestos grates.

In connection with this exhibition a word should be said with special regard to the high-power burners exhibited by Messrs. Edmundson, Dublin being, so to speak, the birthplace of Mr. Wigham's inventions, which have attracted so much attention. At the present exhibition the first thing that strikes the eye is the enormous lamp erected by this firm in front of the main entrance. This lamp, which is on Mr. Wigham's patent, is estimated to be equal in illuminating power to more than 2000 candles. Powerful as this light is, it is yet greatly surpassed by Mr. Wigham's lighthouse burner, placed at the end of the courtyard. The beam from this burner is thrown across the intervening space on the footway leading to the colonnade of the building, and illuminates it in a most extraordinary manner. Of course, such large lights as these are not applicable in all cases, although it is interesting to know that the much-vaunted electric light would certainly be hard pressed to produce such results as are obtained by these large gas-burners of Mr. Wigham's. For purposes requiring a less diffused light and greater comcentration, Messrs. Edmundson exhibit what they term a railway station lamp. It is hung at the entrance of the colonnade, and throws a strong and intense light for 20 or 30 yards around it. The principle of the lamp is quite new, and it has the advantage of great simplicity of construction. Within the exhibition itself Messrs. Edmundson and Co. exhibit a horizontal silent gas-engine of 3½-horse power, and one of 1-horse power. The latter is arranged in connection with the fog signal apparatus patented by Mr. Wigham, and occasionally its powerful though somewhat unpleasant note is sounded for the information of those who are interested in lighthouse appliances.

There are, of course, the usual water heaters, improved burners, and the other accompaniments of a gas apparatus exhibition; and, as on previous occasions, a lady from South Kensington discourses on the merits of gas as a fuel for cooking purposes, and gives practical illustrations of nearly every branch of useful and ornamental cookery.

BATH GAS COMPANY.—At the annual meeting of this Company recently held, the payment of maximum dividends was recommended on the whole of the paid-up capital, amounting to £6112 10s., leaving a balance of £423 17s. 9d. to be carried forward.

REDUCTION IN THE PRICE OF GAS AT WESTON-SUPER-MARE.—The Directors of the Weston-super-Mare Gas Company, at their last half-yearly meeting, resolved to reduce the price of gas from December next 3d. per 1000 cubic feet, which will make the charge 4s. per 1000 feet, subject to discount according to consumption.

HASTINGS AND ST. LEONARDS GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, the 2nd inst.—Mr. G. SCRIVENS in the chair.

The following report of the Directors was presented:—

The additional retort-house alluded to in the last report is now in a forward state, and it is hoped will be completed in time to assist the carbonizing departments during the coming winter. In order to meet the expenditure consequent on this outlay, the remaining £5 per share on the last issue of 375 shares will be called up for payment on the 1st of October next.

The accounts, duly audited, leave a balance of £4113 11s. 8d., which, with the amount from the last half year, gives the sum of £5522 8s. 7d. to be dealt with by the Shareholders; and it is proposed to pay a dividend at the rate of 10 per cent. per annum on the £25 shares, and a dividend at the rate of 7 per cent. per annum on the whole of the other stock of the Company; it is also proposed to pay the sum of £1 per share to the Shareholders of the £25 shares, on account of the arrears of statutory dividends due on these shares. This will absorb £5418 15s., and leave a balance of £103 13s. 7d. to be carried forward to the next account.

Mr. J. Brown, Mr. E. Hayles, and Mr. N. Parks retire by rotation from the directorship, all of whom are eligible, and offer themselves for re-election.

One Auditor, Mr. F. Bennette, also retires by rotation on the present occasion, and again offers himself for re-election.

The CHAIRMAN, in moving the adoption of the report, stated that a new retort-house was being erected close to the works, and it was hoped that it would be ready for use, or partly so, during the ensuing winter months. The building was one of very considerable size, and he hoped it would answer the purpose for which it was intended. The Directors had recently issued a card of instructions to consumers how to act in the event of an escape of gas, and he trusted there would be fewer accidents in the future.

Mr. J. H. COOK seconded the motion.

Mr. WALDER expressed his satisfaction at the report, and the large amount earned by the Company. He remarked that the consumers might think some abatement could be made in the price of gas, but he was of opinion that this matter should be carefully considered. Let the public consider what risks the Company incurred by accidents, and he believed they would think the original Shareholders were entitled to their dividends before any further reduction was made in the price. If the matter were fairly put before the public they would see that the payment of the back dividends ought to be made.

Alderman GAUSDEN, a Director, said the question of reducing the price of gas to the consumers had been under discussion a great many times, and many of the Directors and Shareholders would be benefited by it; but when the matter was looked at in an equitable light, it was only fair that the old Shareholders, who started the Company, and who went short of their dividends, should be considered when the time had arrived. The Directors had fairly regarded the interests of the consumers as well as those of the Shareholders.

Mr. J. ROCK said the Company could not legally form a reserve-fund until the back debts were paid off, though such a fund was much needed.

The SECRETARY (Mr. W. B. Young), in reply to Mr. Elkin, said the Company's premises and plant were insured for £20,000 or £30,000. That sum did not affect anything outside the premises.

The ENGINEER (Mr. A. H. Wood), alluding to the question of risk, referred to an accident that had taken place in Wood Street, Cheapside, London, some years ago, which cost the Gas Company supplying the district £30,000, and a serious accident had also occurred through a steam roller in one of the streets at Brighton. About a week previously an accident which might have been attended with most serious consequences occurred in Eversfield Place, Hastings. Some excavations had been made there, opposite the Alexandra Hotel, and after the hole had been filled up in the usual manner the steam roller went over the spot. An hour after midnight the main-pipe, which was 5 feet below the surface, was smashed, and the gas was forced into the hotel. Fortunately, a police-constable smelt the gas, and gave warning at the gas-works, and in an hour from the occurrence the men were at work repairing the damage. The Company were always liable to this sort of thing, especially when a steam roller was at work.

The motion was carried unanimously, and the retiring Directors and Auditor having been re-elected, a vote of thanks was accorded to the Chairman, and the proceedings terminated.

SUNDERLAND GAS COMPANY.

The Annual General Meeting of this Company was held on Wednesday, the 1st inst.—Mr. E. C. ROBSON in the chair.

The report of the Directors, which was taken as read, was as follows:—

The Directors herewith submit the accounts for the year ending June 30, 1880. After a due consideration of the present position and prospects of the Company, and of the various interests committed to their charge, the Directors feel themselves warranted in recommending such a reduction in their scale of charges for gas as will make the net price for prompt quarterly payment 2s. 7d., 2s. 5d., and 2s. 3d. per 1000 cubic feet, according to the quantity consumed.

An interim dividend was paid in March last, and your Directors now recommend the declaration of a further dividend of 5 per cent. on the original stock and 4½ per cent. on the additional capital stock of the Company. They also recommend the payment of 5s. per share on the original stock of the Company, on account of the deficiency of the dividends of previous years.

The retiring Directors are Messrs. James Hills, James Stokoe, Henry Taylor, and James Laing. The retiring Auditor is Mr. H. G. Armstrong. The whole of the above are eligible for re-election, and offer themselves accordingly.

[The statement of accounts showed that upon the income and expenditure of the year ending June 30, 1880, there was a balance in favour of the Company of £21,619 5s. 10d.]

The CHAIRMAN, in moving the adoption of the report, said the history of the Company during the past year had been one of uniform quiet success, and did not present a single point upon which he could dwell. When the Shareholders compared the various items of income and expenditure, they would find that there was scarcely any difference between those of the past and those of the previous year. The profit for the year was amply sufficient to pay the statutory dividend, and also to give those patient men who had been Shareholders from the beginning a bonus towards making up the deficiencies of former years. This was the more satisfactory, seeing that during the last six years the Directors had made no less than five reductions in the price of gas. They had estimated the reduction of last year as equal to £1000 put into the pockets of the public, and yet it would be seen that there was only a decrease of £134 in the rental. Stimulated by this experience, which had been uniform over the four or five reductions hitherto made, the Directors now proposed to present the public with an equivalent to £2000 more, in the shape of another reduction; but he trusted the Company would be recouped by increased liberality in the use of gas, and that the various modes in which it could be employed other than those of giving light, would be adopted by the public, and that thus the Company would be enabled to maintain their present excellent position, notwithstanding the sacrifice of £2000 they were making. The Company had at present some £13,000 in the bank, and the dividends amounted to £11,000. With the exception of current week to week accounts, they were positively out of debt.

The motion was seconded, and carried unanimously.

On the motion of Mr. RICHARDSON, seconded by Mr. F. VINT, the dividends recommended in the report were declared.

The retiring Directors and Auditor were then severally re-elected, their fees being respectively increased by £100 and £5 5s. per annum.

The proceedings then terminated.

At the conclusion of the business meeting the Shareholders present were conveyed to the Company's works at Hendon, for the purpose of inspecting the improvements that have recently been made. The extensions of the working plant are consequent upon the success which has attended the Company's operations of late years, and the increased demand for gas. They have been in progress for some time, and have been carried out in the most complete and substantial fashion, under the direction of Messrs. T. and C. Hawksley. It is contemplated by means of this extension to more than double the gas-producing power of the Company, so that they may be in a position to meet any demand which renewed commercial prosperity may enable Sunderland to make upon them. Mr. C. Hawksley and Mr. Jolliffe (the Manager of the works) acted as guides for the visitors, who were conducted first of all through the old retort-house. Passing thence to the new retort-house, they were enabled to see the contrast between the old and the new mode of working. This house, which will contain 336 retorts, is 250 feet long and 52 feet wide, and has on either side coal sheds of equal length, and 30 feet in breadth. The coal waggons are run into the sheds upon gantries, connected with the North-Eastern Railway, which runs close by. The hydraulic mains and the condensing apparatus are also constructed upon an improved principle. The new purifying-houses were also visited, and the inspection closed at the handsomely fitted new meter-house, where several ingenious automatic arrangements for indicating the operations of the men in the retort-houses, the pressure of gas in the town, &c., were objects of much attention. With the old works the Company were able to manufacture 1,250,000 cubic feet of gas per diem; but when the extensions are completed they will be able to produce daily, if necessary, 2,750,000 cubic feet. The whole additional plant consists of the retort-house, which is equal to the manufacture of 1½ million cubic feet of gas per day, with all necessary connections; three new boilers, each 20 feet long by 5ft. 6in. in diameter; three new exhausters and engines, each capable of passing 63,000 cubic feet of gas per hour; and one additional meter to pass 60,000 cubic feet per hour; two new 24-inch governors, each competent to pass 80,000 cubic feet per hour; new water and gas pumps, with two engines for working them; and a sulphate of ammonia house constructed to produce ten tons of sulphate per day. This building was set apart for luncheon, which was partaken of by a numerous company, the Chairman of the Company (Mr. E. C. Robson) presiding. After luncheon a number of toasts were proposed, including "Continued Prosperity to the Sunderland Gas Company," "Our Sister Gas Companies," "The Engineers," "The Trade and Port of Sunderland," and "The Officials;" and each having been suitably responded to, the proceedings ended.

WAKEFIELD GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on the 16th ult.—Mr. W. STATTER in the chair.

The CHAIRMAN said all the Company's works were in good condition, yet the Directors were improving them. They were constructing a new gasholder and condensing apparatus. The condensation was gradually becoming insufficient, and the Directors had availed themselves of the most recent improvements in condensation, by which they hoped to make gas purer than it had hitherto been. The cost of this alteration would be about £1000, and it was proposed to pay out of the revenue the greater part, and the remainder would be charged on the coming half year's income. The leakage had been reduced to 10¾ per cent. The illuminating power of the gas had been maintained on the average at 17 candles. The Directors had always endeavoured to keep the gas as free as possible from sulphur and ammonia, but by an improvement of the machinery they hoped still further to reduce the quantity of this impurity in the gas. With regard to the accounts, although the Company had reduced the price of gas 3d. per 1000 feet, there was a reduction of only £88 for the half year in the income. They had expended £450 less than they did a year ago in the manufacture of gas. The profit for the half year was £6165 19s. 4d., against £5862 in the corresponding six months of last year, so that there was £303 more profit, and this notwithstanding the reduction, which amounted to £750 on the half year's income. The Directors proposed to carry a sum of £1243 11s. 7d. to the reserve-fund, which would then stand at £6718. Their insurance-fund amounted to £2783 19s. 6d. The Directors considered the statement of accounts a satisfactory one, and he begged to move that they be passed.

Mr. W. BRIGGS seconded the motion, and it was carried unanimously.

The retiring Directors, Alderman Connor and Mr. R. G. Aked, were re-elected, and Mr. G. V. Ellerton was again appointed one of the Auditors.

On the motion of Alderman HOWDEN, seconded by Mr. ROBERTS, a sum of £25 was voted out of the funds of the Company for a dinner to the Shareholders at the next half-yearly meeting.

A vote of thanks to the Chairman closed the proceedings.

RICHMOND (SURREY) GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held on Thursday, the 26th ult.—Mr. F. CHAPMAN in the chair.

The SECRETARY (Mr. E. B. Blott) read the Directors report, which stated that the result of the Company's operations for the half year ending June 30 last enabled them to recommend the payment for that period of a dividend of 5 per cent. on the original capital, and 4½ per cent. on the new capital, being at the rate of 10 and 9 per cent. per annum respectively.

The CHAIRMAN, in moving the adoption of the report, congratulated the Shareholders upon the condition of their works, and said the Directors were happy to be in a position to recommend full dividends. There had been a considerable outlay this year; but it had been necessary in order to keep the works in thoroughly efficient order, apart from the expenditure in improving the purifying plant of the Company, so that they might have their gas free from sulphur and other things that sometimes brought gas companies into trouble; not that it was the fault of the companies, but more often that of the consumers themselves in not looking to the efficiency of their burners. A lady lately complained to him about the dimness and impurity of the gas; and it came out in conversation that although she had been burning gas for 20 years, she had never once thought of changing her burners. He advised her to have the burners changed at once, which she did, and found the gas very much better. This was the real cause of all the complaints they received about the gas—the fittings were generally out of order, and people did not attend to the proper ventilation of their rooms. The Directors were looking forward to the probability of a large increase in consumption. Gas companies must be always looking to the future to see whether they were in a position to meet the increasing demands made upon them. According to the terms of their Act of Parliament, if people wanted to be supplied with gas the Company were bound to do it, and if they failed to supply gas in sufficient quantity and of proper purity, they, of course, got into trouble. The Directors, therefore, were contemplating the probable increase in the consumption of gas with the building that was going on in the neighbourhood,

and it was possible they might have to ask the Shareholders to grant them increased powers. If so, they would call them together again; but if they could get on without it, they would. However, they asked them to put sufficient confidence in the Directors as would enable them to take steps to increase their powers if necessary.

Mr. RYDON seconded the motion, and it was unanimously agreed to.

Mr. WHITELY said there was in the accounts an item of £6783 for arrears. This seemed to him to be a large amount.

The CHAIRMAN said the arrears amounted to only £3545, which certainly did look a large item, and the only explanation he could give was that it must be reduced by a sum of £2000, which was owing by the parish.

On the motion of Mr. RYDON, seconded by Mr. HILLIER, a vote of thanks was passed to the Chairman, who briefly acknowledged the compliment. The thanks of the meeting were also unanimously accorded to the Manager (Mr. J. Eldridge).

Mr. ELDRIDGE, in reply, said that without going into details, he thought he might assure the Shareholders that the works were never in a more efficient state than at the present time. The expenditure which had lately been incurred, although large, had been necessary, and he thought the Company were in a position to meet considerable demands upon their resources for a long time to come. The quality of the gas was satisfactory, and he trusted the Company would go on as prosperously as they had hitherto done.

The proceedings then terminated.

CANTERBURY GAS AND WATER COMPANY.

The Half-Yearly Meeting of the above Company was held on the 30th ult.—Mr. G. FURLEY in the chair.

The following report of the Directors was taken as read:—

The Directors have the gratification of stating that, notwithstanding the large reduction made by them in the price of gas to the consumers, the profits of the last half year will not only allow them to pay the usual dividend to the Shareholders, but give a bonus to the gas consumers during the next two quarters ending the 31st of December to the extent of 5d. on every 1000 feet of gas consumed.

A considerable portion of the large gas-main referred to in the last half-yearly report has been laid down, and the remainder is now being proceeded with. It has also been deemed desirable to renew some of the smaller gas-mains, and orders have been given for that purpose. All the manufacturing plant at the gas-works is in efficient working order.

The large new lime water and softening reservoirs at the water-works have been successfully completed, and the city is now supplied with water therefrom. The increasing demand for water may render it necessary to further increase the plant, and this subject is now receiving consideration.

The profit and loss account shows a credit balance of £5876 2s. 3d., and your Directors recommend that the usual dividend for the half year at the rate of 8 per cent. per annum, free from income-tax, be declared and paid.

The CHAIRMAN, in moving the adoption of the report, said he thought the Shareholders must one and all be perfectly satisfied with the balance-sheet, for it gave the Directors quite as much pleasure to issue such a statement as it gave the Shareholders to receive it. The document showed them that not only were the affairs of the Company in a continuous state of prosperity, and that the Shareholders would receive their 8 per cent. dividend, but that, in addition, there was a balance left over from the general account of the half year which was sufficiently large to enable the Company to give as a bonus to the consumers a sum of 5d. per 1000 feet of gas for the next two quarters. The Directors could not reduce the price of gas by any large sum, because they were unable to tell what their prospective profits would be, and, therefore, they preferred to give a bonus. The Shareholders must recollect that for every penny taken off the price of gas there was a decrease in the returns of the quarter. He wished them to understand that the money out of which the bonus was defrayed was partly made up of the profits of the last half year, and partly of the accumulated profits of previous half years; they must not imagine they were making sufficient profit to allow of such a bonus being given every half year. There was only one portion of the report that required any notice, and that related to the increase in the water plant. The Directors had hitherto tried to increase the plant in proportion to the quantity of water they had to supply, and now they felt they had a fair working supply. If the consumption were to be materially increased they would have to consider as to providing more storeage room at St. Thomas's Hill, for they had only one tank at present. This, however, was a matter for future consideration, and the Directors wished the Shareholders to understand that they had no present intention of increasing the plant to any material extent. He then alluded to the loss the Company had sustained by the death of Mr. P. Marten, their Deputy-Chairman, and said the number of Directors was now reduced to ten. In January next it would be for the Shareholders to consider whether or not they would increase the directorate to twelve.

Mr. R. H. JONES expressed his satisfaction at the way in which the Directors had carried on the Company's business. He had, he said, been looking round the works that morning, and had found that great improvements had been made, and great economy exercised; a large quantity of old plant had been utilized which by many would have been wasted. It was no disparagement to the officers to say that it was in the retort-house that primarily the money was earned, though it might be wasted outside; and therefore he considered that great credit was due to their Manager. With reference to the Directors, he thought the number should not be increased; but he was of opinion that the time had certainly come when some addition might be made to their remuneration.

Mr. FLINT seconded the motion, and it was carried unanimously.

On the motion of Mr. JONES, seconded by Mr. HUXSTEP, a vote of thanks was accorded to the Directors for their services during the past half year, and an additional £100 was voted to them.

The CHAIRMAN, in reply, said he thanked the Shareholders on behalf of the Directors for the first part of the resolution, but suggested that the latter portion should be left for the meeting in January next to determine. They had not the slightest idea that such a proposition would be made, and hardly knew what course to adopt. He, therefore, thought it would be the best plan to defer their decision on this point.

Mr. JONES thought that as the resolution had been carried by a majority it ought to stand.

Some discussion having taken place,

The CHAIRMAN suggested that the resolution should be allowed to stand on the minutes, leaving it to the Directors to decide whether they would avail themselves of it or not.

A vote of thanks having been passed to the Officers of the Company and acknowledged by the SECRETARY (Mr. J. Burch), the proceedings terminated.

SHERBORNE GAS COMPANY.—The annual general meeting of this Company was held on the 30th ult.—Mr. W. Dingley in the chair. The Chairman went through the accounts in detail, and they and the Directors report were approved, and a dividend of 10 per cent. was declared.

PROPOSED PURCHASE OF THE BRIDGNORTH GAS-WORKS BY THE TOWN COUNCIL.—At the meeting of the Bridgnorth Town Council on Thursday last, it was resolved, on the motion of Mr. Dowell, to enter into negotiations for the purchase of the gas-works.

CORK GAS CONSUMERS COMPANY.

The Twenty-third Half-Yearly General Meeting of this Company was held on the 13th ult.—Mr. T. MAHONY in the chair.

The SECRETARY (Mr. Denny Lane) read the following reports:—

Directors' Report.

You are all doubtless aware of the parliamentary proceedings which have taken place since your last general meeting, at which you sanctioned the provisions of the Bill which we introduced into Parliament. The main features of that measure were a small increase in the Company's capital, and the introduction of the system called the "sliding scale," which makes an increase of dividend dependent upon a reduction in the price of gas. With regard to the capital clauses, the adviser of the Corporation saw no objection to them; and with respect to the sliding scale, the Bill itself actually originated at a conference between the Gas Committee of the Corporation and your Directors, in which a suggestion came from their side that we should adopt that system, which we had no power to introduce without legislative sanction. In the Bill we sought for an initial price of 4s. 6d. per 1000 cubic feet (with a dividend of 8 per cent.), being 3d. less than that which our Act of 1868 permitted us to charge, and the Committee of the Corporation had approved of these terms before we lodged our Bill. Subsequently, however, the Corporation sought to cut down the initial price to 3s. 6d. We offered to adopt the same scale of prices, dividends, and illuminating power as the Chartered Company of London, which, we believe, manufacture more gas than any other Company in the world; but the Corporation would not assent, and opposed the Bill before a Committee of the House of Commons. That body fixed the initial price at 4s., or 9d. under that which we could have previously charged. Your Directors, taking into account the probable advance in the prices of coal, freight, &c.—prices which perhaps are now at the minimum point—thought it would be detrimental to the interest of the Company to accept so low a datum line, and finally offered the Corporation to accept an initial price of 4s. 3d., a proposal which was rejected by that body. The Bill has therefore not been proceeded with, and, in abandoning it, the Directors have been fortified by the unanimous opinion of their professional advisers.

We may remark that the London Companies are allowed, with 8 per cent. dividends, to charge 4s. 5d., together with meter-rent. Taking into account this item along with the excess of the rates in Cork over those in London, the price allowed in the Metropolis would be equivalent to 4s. 9d., or 9d. over that to which the Committee desired to restrict the rate in this city, where the consumption of gas is only 1-70th part of that supplied by one out of the several London Companies.

The loss of the Bill entails consequences which will be against the interests of the consumers, who would obtain two-thirds of any saving that could be realized in the manufacture of gas; while, so far as you are concerned, the rather remote possibility of an increased dividend is compensated for by the security which you have that by a safe margin of price your present dividend will be steadily maintained.

The accounts for the past half year, so far as manufacture and consumption are concerned, do not call for any particular remark.

We have just fixed a new scrubber, which will enable us to produce a larger amount of ammoniacal salts from the material used.

As the present prices of coal, freight, &c., will permit us to do so, we have resolved to reduce the prices of gas to 4s. 2d. within, and 4s. 8d. outside the Corporation lighting district, and that the reduction shall take effect from Midsummer. One of the motives inducing us to take this step is the hope that it will lead to an increased consumption of gas.

We have charged the profit and loss account with £969 14s., on account of parliamentary expenses, and have added £300 to the depreciation-fund, which, in the opinion of your Consulting Engineer, is not so large as it should be. After these deductions the balance of profit and loss account is £5952 10s. 9d., out of which we recommend that the usual dividend of 8 per cent. should be paid. This will absorb about £5416, and leave a balance of £536 to be added to reserve, which will then stand at £12,503.

Two of your Directors, J. O'Sullivan, Esq., J.P., and Richard J. Barry, Esq., go out of office by rotation, are eligible, and offer themselves for re-election.

One Auditor, E. M'Carthy, Esq., goes out of office by rotation, and is re-eligible.

Engineer's Report.

To the Directors of the Cork Gas Consumers Company.

Gentlemen,—I have surveyed the works to-day, and beg to report as follows:—

The repairs for the season are well in hand, and will be completed in good time for the coming winter.

Subject to the experience of another winter, I think the time is arriving when the following works should be considered, or so much of them as may appear desirable to be forwarded next spring:—First, a portion of the present sulphate works, as I have pointed out to Mr. Travers, to be formed into a store for salts; secondly, the four old purifiers now removed to be reconstructed as two large purifiers, with such additional plates as may be required to make them about 20 feet square, and to be worked as extractors of carbonic acid, before the gas proceeds to the oxide purifiers; thirdly, a delivery-main of about 24 inches diameter, to be substituted for the present 18-inch main leading from the old works, whence it supplies two 10-inch mains near the crossing of the Bandon Railway, to be connected to one of the present 10-inch mains there; the other 10-inch main to be lifted, and an 18-inch continued in its place about as far as Parliament Bridge, and possibly some enlargements may be required afterwards on the other side of the said bridge.

A very considerable portion of the cost of the above alterations should be borne by the depreciation account, inasmuch as a great part of it will be for reconstruction of what has already been paid for out of capital.

Your new works are now 23 years old. Those you bought from your predecessors are over half a century old. Neither have, therefore, the vitality they once had; from which you will see the necessity, as opportunity offers, of maintaining your depreciation-fund in such a condition as to meet calls on it, which you must expect in the future, and to which past experience cannot be any sufficient guide.

Cork, July 17, 1880. (Signed) GEORGE ANDERSON.

Capital Account, June 30, 1880.

Dr.				Cr.			
Share capital		£150,000	0 0	Amount paid on shares		£135,602	0 0
Debenture capital		18,200	0 0	Ditto debentures		18,200	0 0
				Uncalled capital and shares not registered		14,397	0 0
				Due by Shareholder on registered share		1	0 0
		£168,200	0 0			£168,200	0 0

Revenue Account.

			Rental—			
Coals	£6,163	13 7	Mar. quarter	£10,154	8 9	
Labour	2,911	19 8	June ditto	4,888	3 10	
Wear and tear	1,945	3 9			£15,042	12 7
Purifying materials	182	5 10	Public lighting—			
Water and gas at works	112	4 4	Mar. quarter	£1,235	16 5	
Public lighting	252	11 2	June ditto	785	3 4	
Salaries	954	10 0			2,020	19 9
Rents	164	1 8	Residuals		4,982	3 7
Rates	844	7 4	Transfer fees		4	19 6
Advertising and stationery	70	7 5				
Office expenses	170	11 9				
House and office repairs	11	15 2				
Auditors	20	0 0				
Directors	175	0 0				
Profit and loss	8,052	3 9				
	£22,030	15 5			£22,030	15 5

The CHAIRMAN, in moving the adoption of the report, said it would not be necessary to detain the meeting very long, inasmuch as the Directors had, in their report, gone very fully into all the affairs of the Company since the last half-yearly meeting. Of course the Shareholders had read the reports in the public press of the views taken by people in the city with regard to the action of the Company in going to Parliament. He might state that the initiation of the Bill promoted by the Company last session came entirely from the Corporation, at a conference which was held in October last between the Lighting Committee of the Corporation and the Directors of the Gas Company. On that occasion, before entering into any figures or stating any price of the contract for the lighting of the city, the Directors explained to the Corporation Committee that the Gas Company had been heavy losers in repairing the public lamps. The Company had engaged to keep the public lamps in repair at a cost of 3d. per 1000 feet in addition to the price fixed for the gas supplied. They explained that this price was not sufficient to cover the outlay, and they

proposed that the Corporation should pay the actual cost the Company might be out of pocket and no more, the sum to be fixed weekly or monthly as the Corporation pleased. The Directors thought this proposition fair and reasonable, for as the making of gas was the business of the Company, this repairing of the lamps was outside their business, and they thought they should not be anything out of pocket by the transaction. He did not remember hearing any expression of disapprobation of the proposal, which offered no point for discussion, and was never intended to be the cause of dispute between the parties. On the same occasion the Directors complained of what they thought a very unfair method of lighting the public lamps by the Corporation officials. It had been the practice of the men lighting the gas to pass by the meter lamps, lighting the lamps without meters, and then, in perhaps an hour and a half, when a good deal of the gas had been burned, coming back and lighting the meter lamps. The Directors informed the Corporation that they suffered a heavy pecuniary loss by what they considered to be a very unfair way of dealing with the public lighting of the city. The Committee of the Corporation expressed their surprise and disapprobation of any such thing, and the Mayor requested the Directors to put their complaint in writing in reference to this subject. They did so, and the next day furnished that complaint to the Corporation, with a statement referring to various lamps in different parts of the city. They had been for a considerable time watching the way in which those lamps had been lighted, and had kept detectives in different parts of the city, so that the Directors were enabled to put before the Corporation facts which they considered were of such a startling nature that would produce an immediate investigation, and cause the Company to be treated in the ordinary honest way of dealing between people who buy and sell. Unhappily, however, the Directors never had a single notice taken of their complaint until the 7th or 8th of May, when the Company were going to Parliament with their Bill. The Company brought this complaint before the Committee of the House of Commons, and when they were challenged to bring forward evidence on the matter they put Mr. Travers up for examination; but the Counsel for the Corporation declined to cross-examine him. The next point discussed at the conference was the question of lighting the city. An intimation of adopting the sliding scale was brought forward, and it was discussed by the united Committee of the Directors of the Company and the members of the Corporation present. Finally the Company were asked to tender for the public lighting of the city for the ensuing three years, according to the old system and also according to the sliding scale. The Directors explained that it was impossible for them to give a tender under the sliding scale unless they were enabled to do so by Act of Parliament. The tender under the old system was sent in to the Corporation the next day, and, of course, the Company took the necessary steps to bring the matter before Parliament, which was done in November, when notice of the Bill was given, although the Bill itself was not lodged until the 17th of December. From that day up to the present they never had any official communication from the Corporation disapproving of their action in going to Parliament for that Bill. In fact, so little was the objection the Corporation seemed to attach to it, that more than once the question of the sliding scale had been approved of. The Committee made a report to the Council in which they recommended that the new contract be entered into on the terms already published. The recommendation to adopt the sliding scale was the unanimous opinion of the Committee, and whether there were many or few members present it was not the business of the Company to go about testing it one way or the other, and they consequently could then see no reason why they should hesitate to go on with their Bill. He made those remarks in consequence of a statement which fell from the Mayor on the last occasion on which a discussion took place with reference to the action of the Company in putting forward the Bill. The Mayor said that neither the Corporation nor any Committee of the Corporation ever solicited the Company to go to Parliament. Now, a statement like this coming from the Mayor would bear greater weight and force than from others who interested themselves in the matter. However, the Gas Company were fully authorized in everything they had done, and they did not unnecessarily tax the consumers or the Shareholders by their action in connection with the Bill. The Committee of the House of Commons heard both sides, and the case of the Company was very strongly put by their Counsel. The Company's witnesses gave evidence that they should have 4s. 6d. per 1000 feet as the initial price for the gas, and the evidence of the Corporation witnesses was equally strong, and their Counsel spoke equally firmly that the Gas Company should only be allowed 3s. 6d., and some said 3s. 9d. per 1000 feet. The Committee decided on splitting the difference, and fixed on 4s. per 1000 feet as the initial price. Immediately on this decision being come to, there was a consultation of the Company's Counsel and Engineers, and it was their unanimous opinion that if the Bill were accepted the Directors would be sacrificing the interests of the Shareholders, and as a consequence they would only be able to pay 8 per cent. dividend, and if the price offered by the Corporation were accepted the Shareholders would only get 7½ per cent. When the Directors returned to Cork the question was again debated. They considered that all the expenses that had been incurred could have been avoided by some understanding on both sides. With that hope the Directors decided to offer the gas to the Corporation at the initial price of 4s. 3d. per 1000 feet. This offer would give the Company an opportunity of getting a little more than the statutory dividend. It was stated in the Corporation that the Bill was brought to serve the Company and against the consumers. The Company went to Parliament to benefit themselves, and they also believed they would benefit the consumers. He would wish the Shareholders to remember that a reduction of 1d. in the price of 1000 feet of gas would represent a deduction of £700 on the profits, and, therefore, a reduction of 4d. would represent a loss of £2800. The Directors made this offer of 4s. 3d. to the Corporation, but they declined to accept it. He was very glad they had done so, for the Shareholders would now get a dividend of 8 per cent., which was as secure as any preference share in any railway in the United Kingdom. As they now stood the Company had a margin of 7d. per 1000 feet, which they could call upon from the consumers, and if they raised the price 9d. they would add £5000 a year to the income which they could fall back upon to make up that 8 per cent. when an emergency might arise. If it were true, as had been sworn to by some experts in the House of Commons, that gas could be supplied in Cork for 3s. 6d. per 1000 feet, the present Company could supply it as cheaply as anybody else. The Company considered they supplied the gas in a manner that could not be done better by any other company, considering all the surroundings. Therefore, if gas could be made for 3s. 6d. per 1000 feet, they had a margin of 1s. 3d., which would represent an increase in the year of £10,500, and this could go to support the payment of the 8 per cent. dividend, so that the Shareholders were sure of the 8 per cent. dividend, no matter what circumstance might arise. They might have a coal famine, as on a previous occasion; but the Company would always be in a position to ensure the payment of the dividend. The Company were charged with all kinds of mismanagement; but he could assure the meeting that the officials took as much interest in the Company as if it were their own private concern. In conclusion, he repeated that the Directors had never received from the Town Council a single official notice disapproving of the Company's action in going to Parliament.

Alderman KELLER, as a member of the Corporation, considered the whole body should not be blamed for the acts of a few. When a man of Mr. G. W. Stevenson's character, whose opinion stood so high, represented that gas could be supplied in Cork for 3s. 6d. per 1000 feet, the Corporation, as the representatives of the ratepayers, were perfectly right in insisting upon this. Mr. Stevenson was the person who led them to believe that they could have gas at 3s. 6d. per 1000 feet, and he trusted the Gas Company would come forward and give them gas at 4s., thus putting an end to all differences. He thought a good deal of expense might have been saved if some kind of arbitration had been arranged.

The CHAIRMAN said that it would be impossible to have any arbitration unless the two parties consented. More than once the Directors intimated that they were prepared to enter into an amicable arrangement, but they had received no proposals. The Directors showed their willingness to try and come to some settlement by the fact of their going to an informal meeting of the Ratepayers Association. On that occasion the Secretary put forward the views of the Directors, and made a proposal to supply gas at the same price as supplied in London by the largest Company in the world, and if the people were not content to have the gas at that price he thought it was very unreasonable.

Mr. M'CARTHY said the only way to meet them was to supply good gas.

The CHAIRMAN: We have not had a single complaint as to the quality of our gas.

The SECRETARY: The gas supplied by the Company has been tested twice a day by the Corporation officials for many years, and there has never been a single complaint made of its illuminating power. It is tested at the office, and also at the gas-works, and has always been found to be 15 or 20 per cent. above the standard the Company are obliged to supply.

Mr. G. ANDERSON, the Company's Engineer, said he was very sorry that after all the liberality with which the Company had acted for many years, and the great success which had enabled them to act with that liberality, the citizens of Cork, or some of them, were so uncivil as to find fault with them. He did not know any company that had been more successful than the Cork Gas Consumers Company, nor one that had supplied gas at a cheaper rate, considering many circumstances. They commenced when gas was 6s. 8d. per 1000 feet, and they proposed to supply it in the beginning at 5s. 6d. per 1000 feet. In addition to this, in consequence of the old Company reducing the price by 2s. 6d., this Company supplied gas at 4s. 6d. per 1000, which was 1s. per 1000 less than the people were told they would have the gas for. From that time the Company had gone on lowering the price until they brought it down to 4s. 6d. He did not know that the Company should blame those parties, either in the Corporation or amongst the citizens, who spoke against them; because, having an expert to advise them, if he said the price should be a certain sum, how was any member of the Corporation to contradict him? However, certain things occurred in the House of Commons committee-room which ought to have enlightened the men of any Corporation who understood business. Mr. Stevenson, on cross-examination, had to admit that in arriving at the initial price of 3s. 6d. he had only taken the expenses appearing on the Company's revenue account. He did not take into consideration the expenses appearing on the profit and loss account. Those expenses amounted to £1500 or £1600 per year, and included the general charges incidental to a large concern. Mr. Stevenson had to admit that he did not calculate on those. He (Mr. Anderson) saw in some of the papers that he had been reported to have stated that gas could not be made for less than 4s. 6d. per 1000 feet; but, if the evidence was carefully read, it would be found that he did not say anything of the kind. He said 4s. 6d. was the lowest price the Company should take as the initial price for gas; if they went above this, they would have to reduce their dividend, and if they went below it they would have to increase their dividend. According to the Act of 1847, all gas companies were allowed to pay 10 per cent., and every company had followed this out, and if this Company were as wise as they now were, they would also go in for 10 per cent. Another complaint made against the Company was that they had tried to get their dividend increased to 10 per cent., and this was one of the grievances put forward in the House of Commons Committee. Now, the Company had continued to sell gas at 1s. per 1000 feet less than they ever promised, and, seeing this, he thought they were justified in taking the course they did. The Committee simply decided on dividing the difference, and the Company could not, with any regard to their own interest, accept such an initial price as 4s. per 1000 feet. They were enabled, at present, to make a reduction of 4d. per 1000 feet, in consequence of the very low rate at which materials had been selling for some time past, and the freights of those materials at present actually cost the Company less than the shipowners. The same with the collieries; they were all working at a low rate because the supply of the article produced was greater than the demand for it. But suppose the trade of the country improved, why should not the price of coal rise to the average for the past 30 years? and if the price of coal went up, the Company could not sell their gas for 4s. per 1000 feet. Coals were now 3s. or 4s. per ton less than the Company had to pay when the works were started. Could the Company believe that the Directors could manage to screw out 8 per cent. on 4s. 2d. per 1000, with their present expectations regarding coal and labour? He was very much of opinion that the Company had been too liberal to the consumers. The law told them that they should have a reserve-fund in case of exigencies, as happened a few years ago, when the Company were actually reduced to 5 per cent. dividend and the shares fell from £8 to £5, and many of the Shareholders sold out at this price. A contingency like this might happen before this time twelve months, for if the Eastern and Southern affairs of the Government became disturbed, every vessel might be engaged, and the freight become very high. It appeared that by making a reduction from 4s. 6d to 4s. 2d. per 1000 feet the Company were lessening their income by something like £2800; that was, if they had had the price at 4s. 2d. for the last half year there would be £2800 less on the balance-sheet than there now was, or £5100 instead of the £8000 profit. At that time the coal was so high that the balance of the Company went down to £1600. He did not think this prudent at the present time, and the Company should, as the law allowed them, add to their reserve-fund. They would also have to be making some improvements in the works, which he had mentioned in his report. He found that the consumption of gas was increasing, and they had to put on increased pressure. The moment there was increased pressure there was a complaint of bad gas. To meet this, and in order that there should be sufficient pressure, it was his opinion that there should be larger mains laid down from the works, and this would, according to his calculation, cost very nearly £2000; but the old mains, which would go to stock, would reduce the expense by £200 or £300. He thought it was not prudent for the Company, under the present prospects, to take this large sum out of their hands, and, in his opinion, they should take off 2d. per 1000 feet now, and give a promise to take off the other 2d. during the next twelve months, according as the Company could see whether they could do so or not. The proportion of the reduction was very little to each consumer, but it

was a matter of considerable importance to the Company. The expenses of new works also required that a depreciation-fund should be formed, and then, as had been remarked, there might be an explosion, and therefore the Company should have "shot in the locker" for anything of that sort. He would say reduce the price to the consumers as much as possible, but consider yourselves as well; and he thought the Shareholders were not considering themselves in making this reduction.

The SECRETARY said he might remark that in 1867, when coal was as cheap as at present, and labour far cheaper, Mr. Stevenson recommended that the initial price should be 5s. per 1000 feet, and he now recommended that the price should be 2s. 6d. per 1000. He might also state that Mr. Stevenson gave evidence a short time ago on the Londonderry Gas Bill, to the effect that the Londonderry Company should charge 5s. 9d. per 1000 feet besides meter-rent, and have a dividend of 10 per cent. If the Londonderry Company reduced their dividend to 8 per cent., they would be entitled to charge 8d. more than the 5s. 9d,, and this would give them 6s. 5d. in addition to the meter-rent, which would be a good deal more if the extraordinary taxation on the Gas Company in Cork were taken into account as compared with any other company. It all came to this, that 6s. 9d. was the right price for Londonderry, and 3s. 6d. the right price for Cork.

Mr. LYNCH seconded the motion, which was carried unanimously.

Mr. B. J. ALCOCK proposed that a dividend of 8 per cent. be declared on the paid-up capital of the Company.

Mr. FRYER seconded the motion, and it was agreed to.

The retiring Directors and Auditor were severally re-elected, and a vote of thanks to the Chairman terminated the proceedings.

METROPOLIS WATER SUPPLY.

The following are the returns made by Dr. C. Meymott Tidy, M.B., &c., on the Composition and Quality of the Metropolitan Waters in August, 1880:—

[The results are stated in grains per Imperial gallon of 70,000 grains.]

NAMES OF WATER COMPANIES.	Total Solid Matter.	Oxygen required by Organic Matter, &c.	Nitrogen.—As Nitrates, &c.	Ammonia.	Hardness (Clark's Scale).	
					Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·72	0·072	0·142	0·000	14·3	2·4
West Middlesex	20·76	0·080	0·125	0·000	14·3	2·0
Southwark and Vauxhall	18·39	0·060	0·125	0·000	14·3	2·4
Chelsea	18·82	0·120	0·125	0·000	14·3	2·6
Lambeth	19·72	0·080	0·125	0·000	14·0	2·8
Other Companies.						
Kent	30·17	0·000	0·410	0·000	21·2	5·2
New River	20·14	0·028	0·142	0·000	14·8	2·4
East London	20·25	0·036	0·137	0·000	15·4	2·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Executive Committee formed for holding an exhibition of gas apparatus, &c., in connection with the Philosophical Society of Glasgow, during the four weeks commencing on the 28th inst., held a meeting on Friday in the office of the Secretary and Treasurer, Mr. John Mann, C.A., —Dr. Wm. Wallace, Gas Examiner for the City, in the chair. Favourable reports were made as to the progress of the labours of the various Sub-Committees, and it was confidently anticipated that, from the applications for space by intending exhibitors, and further promises of hearty co-operation on the part of many persons, there would be an unusually interesting and instructive exhibition. On the motion of Mr. A. Lindsay Miller, Secretary of the Sanitary Section of the Philosophical Society, seconded by the Chairman, it was unanimously resolved to appoint Mr. John Mayer, F.C.S., Superintendent of the Exhibition.

It is very satisfactory to know that Pintsch's system of lighting buoys for river navigation is now making decided progress, of which evidence is obtained from the action of the Clyde Lighthouses Trustees. At a meeting of that body held last Wednesday it was resolved, on the recommendation of the Chairman (Mr. Thomas Henderson) and the Committee of Management and Finance, that as the experience gained with the gas-lighted buoy at Roseneath Patch had been so very satisfactory, it should be retained there permanently, and that one should be ordered for Garvel Point, and another for Skelmorlie Bank. On the following day several members of the Trust, accompanied by Provost Sommerville, of Port Glasgow, made an inspection of a number of sites which have been proposed for the erection of a gas-works in that burgh suitable for the manufacture of gas for those buoys.

The annual general meeting of the Bervie Gas Company was held on Monday of last week—Mr. R. Glegg, banker, in the chair. An abstract statement of the income and expenditure for the past year was submitted by the Secretary, and it was resolved to declare a dividend of 3 per cent. The Directors were re-elected, as was also Mr. D. Urquhart, Secretary and Manager; and the Directors authorized the Treasurer to enter legal proceedings against all consumers two quarters in arrear with their accounts.

At a meeting of the Town Council of Aberdeen, held on Monday, the 6th inst., the proposed Borrowing Powers Bill was brought up for consideration by a report from the Finance Committee. In connection with the gas supply undertaking of the city, it was proposed by the Committee to obtain power for borrowing the sum of £55,000 for new gas plant, &c., and to reduce the illuminating power of the gas from 30 to 20 standard candles. The additional works proposed would consist of retort-house, coal-store, purifier-house, and purifiers, £11,050; gasholder and two tanks, £23,000; gas-mains, £8700; and meters, £7500; with contingencies estimated at £4750. In referring to the proposed reduction of the illuminating power of the gas, the Lord Provost remarked that, as was explained in the Committee's report, the Aberdeen Gas Act only required 14 candles. In Dundee the legal minimum illuminating power of the gas was 18 candles, and in Edinburgh and Glasgow it was 25 standard candles; but in Aberdeen the illuminating power had of late been higher than in any other town in Scotland. After considerable discussion it was agreed to ask powers to borrow £30,000 for improving the water service—£24,000 for additional water-mains for the city and suburbs, £3750 for new pumping-engines at Cults, including site, and £2250 for contingencies.

After the subject has been long talked of in the town, and occasionally referred to at meetings of the local municipal authorities, it was unanimously resolved, at a special meeting of the Police Commissioners of Helensburgh, held last Thursday, to adopt the Burghs Gas Supply (Scotland) Act, 1876; and it was also resolved that another special meeting be held on Monday, the 22nd of November, to resume consideration of that resolution.

The Dumfries and Maxwelltown Water Commissioners have resolved, with a view to checking waste, to introduce the system of charging for water consumed for other than domestic purposes, excepting for shop and garden hose, for the former of which 2s. 6d. per annum will be charged, and for the latter 5s.

At a meeting of the Hamilton Water-Works Commissioners, held on Thursday, the public water-rate was fixed at 5d. per £1 of rental, and the domestic rate at 6d. per £1. It was reported by the Works Committee that the quantity of water in store was equal to a supply for 70 days.

Mr. F. Mackison, C.E., Stirling, has just made a report to the Water Commissioners of that town upon a proposed extension of the water supply works. If his most likely proposal is carried out, it will give a supply equal to 232 days for a population of 20,000 inhabitants, allowing 50 gallons per head per day.

Several smart fluctuations in prices took place in Glasgow pig iron during the past week. Up to 53s. 11d. cash was paid on Tuesday, and by Friday afternoon there was a decline of 1s. 2d. per ton. A large business was done daily.

The strike amongst the coal miners has collapsed, and it is probable that before many weeks have passed the coal trade will be greatly improved.

NOTTINGHAM CORPORATION GAS SUPPLY.

ANNUAL REPORT AND ACCOUNTS OF THE GAS COMMITTEE.

At the Meeting of the Nottingham Town Council on Monday, the 6th inst., the annual report of the Gas Committee and the accounts of the Gas Department, for the year ended June 30 last, were presented.

The Committee state that from the accounts it will be seen that there is a balance on the profit and loss account of £23,226 14s. 5d. in favour of the Committee. This balance remains at the disposal of the Council for the purposes mentioned in the 7th sub-section of the 36th section of the Nottingham Corporation Gas Act, 1874. The Committee recommended that after payment of £12,500, by order of the Council made on June 17, the sum of £7021 2s. 6d. should be set aside for the extinguishment of 90 gas annuities which have been purchased by the Committee under the powers given to them by the above-named Act, and that the balance, £3705 11s. 11d., should be carried to the credit of the reserve and sinking fund. The Committee further recommended the Council to reduce the price of gas 2d. per 1000 feet from Michaelmas next, being the fourth reduction since the undertaking has been in the hands of the Corporation, thus making the price of gas lower than it has ever been in Nottingham.

The accounts show that there is due on capital account £575,115 19s. 6d., made up as follows:—Annuities, £362,413 2s. 6d.; bonds, mortgages, and loans, £70,555; and debenture stock (including premiums), £142,147 17s. The annuities are of the nominal amount of £50 each. Up to the 8th of May next year, they are of the annual value of £3 2s. 6d.; but, after that time, of £3 5s. The other capital bears interest at 4 per cent. The expenditure on capital account to June 30, 1879 (as shown in the JOURNAL, Vol. XXXIV., p. 298) was £518,669 14s. 7d. During the past year there was added to this—for new buildings, manufacturing plant, storeage works, and other structures connected with manufacture, £36,739 6s. 8d.; for new mains, laying, paving, &c., £7891 14s. 1d.; and for new meters, £1362 1s. 5d.—total, £45,993 2s. 2d., making the total expenditure to June last £564,662 16s. 9d., and leaving the capital balance at £10,453 2s. 9d.

The following is the revenue account for the year ended June 30, 1880:—

Expenditure.

Coals, including carriage, unloading, &c.	£54,622 15 11		
Purifying materials, oil, water, and sundries at works	2,595 12 5		
Salaries of engineers, superintendents, and clerks at works	2,559 15 1		
Wages and gratuities at works	21,910 13 11		
Repairs and maintenance of works and plant, machines, apparatus, tools, materials, and labour	8,902 10 7		
	£90,591 7 11		
Less old materials sold	273 1 2		
		£90,318 6 9	
Salaries, &c., of inspectors, clerks, &c., in light office	£6,217 8 10		
Repair, maintenance, and renewal of mains, &c.	1,518 11 4		
Repairing and renewing meters	1,832 14 6		
		9,568 14 8	
Lighting and repairing public lamps		163 1 9	
Rents and acknowledgments	£241 6 0		
Rates and taxes	3,734 9 4		
		3,975 6 4	
Salaries of clerk to committee, bankers, general manager, and clerks	£1,853 18 4		
Collectors	1,163 18 10		
Stationery, printing, stamps, &c.	378 1 0		
General establishment charges and incidentals	783 5 7		
Auditors	50 0 0		
		4,229 3 9	
Law charges		210 14 11	
Parliamentary charges (oppositions)		—	
Bad debts		589 3 10	
Sundries		226 1 1	
Balance		53,016 0 2	
		£162,296 13 3	

Receipts.

Sale of gas—			
Private consumption, 2s. 10d., 2s. 9d., and 2s. 8d.	£118,137 11 11		
Public lights	5,881 11 0		
Rental of meters	5,040 10 11		
		£129,059 13 10	
Residual products—			
Coke and breeze, less labour and carriage	£11,756 3 7		
Tar	12,973 14 1		
Ammoniacal liquor	5,109 18 0		
Refuse lime and other purifying material	482 6 5		
		30,322 2 1	
Sundries—			
Meters, service-pipes, brasswork, and materials of distribution		1,924 0 5	
Fines and penalties		2 0 0	
Rents		747 15 3	
Sundries		241 1 8	
		£162,296 13 3	

The above amount of £53,016 0s. 2d. carried to profit and loss (net revenue) account is disposed of as follows:—

Interest on loans	£2,880 5 7	
,, debenture stock	4,699 4 0	
Annuities	22,159 16 2	
Amount voted by Council towards expense of lowering Carlton Hill	100 0 0	
Balance	23,226 14 5	
	£53,016 0 2	

The reserve-fund account stands as follows:—

Balance brought from last account		£43,487	9 1
„ of profits, June 30, 1879.	£14,957 10 1		
Less amount voted by Council in relief of district-rate	6,000 0 0		
		8,957	10 1
Interest on amount invested		1,899	14 7
		£54,344	13 9

The two following tables refer to the coals carbonized and the residual products produced during the past year:—

Statement of Coals.

Description of Coals.	In Store, June 30, 1879.	Received during Year.	Carbonized, or Used during Year.	In Store, June 30, 1880.
	Tons.	Tons.	Tons.	Tons.
Common . . .	5131	99,997	90,248	14,880
Cannel	103	7,834	7,803	134

Statement of Residual Products.

Description of Residual.	In store, June 30, 1879 (estimated).	Made during Year (estimated).	Used in Manufacture during Year (estimated).	Sold, &c., during Year.	In Store, June 30, 1880 (estimated).
Coke and breeze . Tons.	2,181	60,496	25,705	36,679	292
Tar . . . . . Galls.	206,110	1,247,846	2,000	1,265,040	186,916
Ammoniacal liquor „	222,654	1,744,269	—	1,675,574	291,349

At the meeting of the Town Council above referred to—the Mayor (Sir J. Oldknow) in the chair,

Alderman Thackeray moved the adoption of the foregoing report and accounts. In doing so he said it was a very agreeable task to move the adoption of the Gas Committee's report on this occasion, because they handed over to the Town Council between £23,000 and £24,000, £12,500 of which had been already appropriated, and £7021 was to go towards extinguishing gas annuities, while the remaining £3705 would be added to the reserve-fund. The Committee further recommended that the price of gas should be reduced 2d. per 1000 cubic feet. He thought he might safely say that he did not think the proposed reduction would affect the balance for next year, as the great increase that had been going on with regard to gas consumption was extraordinary; and as the Committee were now able to purchase coal on favourable terms, he thought he was justified in saying that the balance next year would not be less than it was at present. He therefore thought the gas consumers were entitled to a fair reduction in the price of their gas. Looking, as he had done from time to time, at the reports of the various gas companies throughout the kingdom, he had found there had been a gradual reduction in the price; and it was perfectly clear to him that the principle of taxing gas consumers to relieve the rates could not stand; it must break down. He maintained that its inequity could not be sustained, because a reason must be shown why the gas consumer was taxed; and he could not see any reason. It was unjust. The fact that there were now 31,500 gas-meters in Nottingham showed that gas was very generally consumed. To show how successfully the gas-works had been managed during the six years they had been under the Corporation control, he need only mention that the profits which would have been in the hands of the Gas Company would have amounted to £90,650. The cost of capital was now, upon the whole, 5¼ per cent.—just what it was in the time of the old Corporation. Of course, every year, as the Gas Committee expended more money, which they would be compelled to do, that rate would be reduced. The balance of £3705 which they proposed to add to the reserve-fund, brought that fund up to £58,050. It was a very important matter that they should be annually increasing their reserve, so that they might make themselves always secure in case of accident; for, looking at what had recently happened in London, it was well to be prepared for anything of the sort. Altogether, the profit on the year amounted to £23,326, which, with the interest on the reserve-fund added, would make a sum of £25,226. He thought the Council would find that the management of the gas-works was satisfactory. The Managers tried to do the best they possibly could; and, as regarded Mr. Wilson, the Committee could, as heretofore, speak most favourably. Mr. Wilson was very attentive to his duties, and no man was better up in the matter of gas production. Mr. Tarbotton, the Borough Engineer, had been carrying out large works at Radford, and when these were completed they would be as well finished as the other two stations. Altogether, the report was a most favourable one, and one which he trusted the Council would support.

Alderman Howitt seconded the motion.

Mr. Baines asked why the accounts had not been audited by the Borough Auditors this year.

Alderman Thackeray said the matter lay within the discretion of the Gas Committee, and they were not obliged to call in the Borough Auditors.

Mr. Bayley said he thought the accounts should be referred back to the Committee to have them audited in the same manner as last year, as not having them audited in a proper way gave the town an impression that something was wrong. He congratulated the Committee that they had reduced the price of gas for two years 2d. per 1000 feet, and by so doing had increased their profits at the rate of £10,000 a year. The reserve-fund was now £58,050, and he should like to know how that fund was invested. It seemed to him rather curious to borrow £40,000 a year and have £58,050 in the reserve-fund. It was almost a mistake in an undertaking like this to have a reserve-fund. The Nottingham gas supply was the Corporation's undertaking, and the better way would be to buy out the annuities. He noticed that last year there were bad debts to the amount of £598, and this seemed strange when they considered the enormous powers the Gas Committee had. He was sure every member of the Corporation would be sorry for the report to be referred back to the Committee, but, as a matter of duty to the town, he thought it ought to be audited and signed in the usual way, and he would move an amendment to that effect.

Mr. Jacoby seconded the amendment, as he questioned whether the report could legally be adopted unless it was signed and the accounts were passed by the Borough Auditors. It was, he thought, satisfactory to know that there was to be a reduction in the price of gas.

Mr. Gregory, in supporting the amendment, said he was afraid the accounts would not be properly audited until the Corporation had a Government Auditor. He was opposed entirely to the reduction in the price of gas. For many years the town had been put to very great expense in opposing the Gas Company, and only a few years back it had been stated that the towns had better not buy up the gas companies works, as something would be introduced to supersede gas. If such were the case, who would have to bear the loss? The ratepayers of the town; and he maintained that it was to the interest of large consumers of gas that the price should be reduced, but in an undertaking of this kind some profit should, he thought, go to the town.

Alderman Howitt said, in answer to Mr. Gregory's observations, he considered the profit received from the gas undertaking amply recouped them for all it had ever cost the borough previously. As regarded the amendment, he did not know what was to be gained by it. He thought it would be more dignified for the Council to pass the accounts this time, and afterwards pass any resolution they liked to make for the future; but to refer the accounts back simply because they had not been audited by the Borough Auditors implied a want of confidence in the Gas Committee.

Mr. Bentley said the question put by Mr. Baines had not been answered, and he considered that until they had an answer to that question all the discussion would have to be gone over again. He deemed it to be only right that the Borough Auditors should audit these accounts, and they should be brought in a clear, straightforward way before the Council. With regard to the question of reduction of price, there were two sides to it. When coal was high in price, the price of gas was high; and, of course, there should be a reduction in the latter when the cost of coal was less; but they had no right to bring the price so low as to give the large consumers all the benefit. He wished to know whether it was legal to pass the accounts without the signature of the Auditors.

The Town Clerk said the accounts as now presented were strictly in legal form. The Town Council could order them to be audited by any one they pleased. The Borough Auditors had no power in the case unless by order of the Council.

Alderman Gilpin said he should oppose the report being referred back, because even those who wished it to be sent back were satisfied. Mr. Baines said he knew the accounts were perfectly correct, therefore it would be putting the town to needless expense and causing unnecessary delay to send the accounts to the Borough Auditors.

Mr. Robinson regarded referring the report back as not only just to the ratepayers, but as likely to remove any doubt as to the nature of the accounts of the Council.

Alderman Thackeray said the Gas Committee had no objection to the Council ordering the accounts to be examined by the Borough Auditors, but the Committee would still have to continue the services of their own Auditor. The accounts were very intricate, and he was thoroughly conversant with them.

The amendment was then put, and lost by 29 votes to 16.

Alderman Thackeray then moved that the price of gas be reduced 2d. per 1000 cubic feet.

Alderman Foster seconded the motion.

Mr. Lindley said he had a few reasons to give for opposing the reduction. The Council were told a short time ago that, owing to pressure put upon them, they made a bad bargain with the people in the county, and the only way to protect themselves was not to charge too low a price for the gas. They distributed gas over an area several times larger than that of the borough, and while it was their duty to supply good gas, they ought to take care to make it subserve the interests of the ratepayers of the town. This undertaking was, he understood, the property of the ratepayers, and if there were any loss they would have to bear it, while the consumers beyond the boundary of the borough would have nothing to fear. The Council were charging what he conceived to be a very low price for gas. They took it nearly to Bingham, and the maximum price charged was 2s. 10d. A step farther and they came to Bingham, a small market town, where the inhabitants supplied their own gas at 5s., and there was no means of testing the quality. In another direction they went almost to Southwell, and at Southwell the price was 5s. Then, again, they went nearly to Long Eaton, where the minimum was 3s. 9d., and the illuminating power 16 candles. At Mansfield, on the way to which they went as far as Annesley, the price was 4s. down to 3s. 3d., and at Newark 3s. 6d., with a quality of 14 candles. At Sutton-in-Ashfield it was 4s. 7d. down to 3s. 5d., and the quality was 17 candles. Then if they compared their prices with those of large towns in the neighbourhood, they were still as low as any. At Derby the price was 3s. and 2s. 8d., and the quality was not so good. At Leicester the price was, to the Midland Railway, 2s. 6d.; to other consumers, 2s. 8d.; and the quality was 16½ candles. At Loughborough the price was 4s. 1d., and the quality 14 candles. He thought the Council would act very unwisely in reducing the price below its present amount. They suffered so much loss in sending gas to the parts of the country he had named, that to reduce the charge would be great folly. He would move, as an amendment, that the price be not reduced.

Mr. Wilson said they seemed to have lost sight of the fact that gas entered very largely into the production of local manufacturers, and it was unfair and unjust to make manufacturers and producers of local articles pay the expenses of the town. If they taxed the industries of the town, they were doing something to take them away, and place them in other towns where there were greater advantages.

Mr. Robinson thought Mr. Lindley's argument ought to show sufficiently that the Council behaved fairly to manufacturers, and to reduce the gas would be a gross injustice to the ratepayers. He could not think for one moment that £23,000 was any great amount of money to take out of a concern in which they had something like £564,000. Then as to what they had to meet, they could only come to one conclusion—that the electric light was "looming in the distance," with a probability of being used for some purposes in opposition to gas. In that case they ought to place something more than £3000 a year to the reserve-fund.

Alderman Barber was very much surprised that mercantile men should look at the reduction in the price of gas in the light that some of the gentlemen in the Council viewed it. It was a fact that articles of commerce—such as colonial produce—always increased in consumption as the price was lowered. The same thing would apply to gas. The lower the price the greater in proportion would be the consumption and the profit. His idea was that one-third of the profit should go to the reserve-fund, one third to the rates, and one-third to the reduction in the price. He trusted this reduction would be sanctioned, as it would be very much to the advantage of the ratepayer as well as the consumer.

Alderman Goldschmidt said in small places where the consumption of gas was not great the cost of the production was enhanced. Here also if they were to raise the price to 4s. or 5s. per 1000 feet, the consumption would be diminished, and the higher price would be legitimate; but while the consumption was increasing it would be simply folly to put on a tax of 7 or 7½ per cent. in favour of the small consumer. The difference between 2s. 6d. and 2s. 8d. was of great importance to large consumers, and proportionately less to small consumers. Mr. Robinson lost sight of the fact that the profit was computed not on capital invested but on the return, and he maintained that if they could make 50 per cent. clear on return, after deducting interest on capital and wear and tear of plant, they would be well satisfied. As for the electric light, that, he was happy to say, was looming a long way in the distance, and it would not be in Mr. Robinson's lifetime that it would be introduced for domestic illumination. He thought the profit on the sale of gas should largely contribute to reducing the rates, and when the reserve-fund reached £100,000 they ought to contribute more than a third or a half to such reduction.

Mr. Cropper, though a member of the Gas Committee, opposed the reduction in the price of gas. Alderman Barber said that if they reduced the price there would be an increased consumption, and he drew this inference—that increased consumption meant increased profit. Now his inference was that if they gave the gas away altogether they would have an immense profit. To his (Mr. Cropper's) thinking, a more equitable way would be to make a larger difference between the minimum and the maximum price. Mr. Wilson said that gas entered largely into the local manufactures. If so, why not reduce the price for manufacturing purposes, instead of reducing it to all consumers? Suppose they made a difference of 15 per cent. in this respect, it would still leave a large balance. Every ratepayer in the town felt the advantage either in a monetary way or from improvements. In Leeds they had the lowest gas-rate in the country, and there were three other towns where it was lower than in Nottingham. These were Burnley, Carlisle, and Middlesbrough. What was the moral to be drawn from this? He would give them Nottingham first. The gas charge there was 2s. 10d. per 1000 feet, the rate was 4s. 2d., and the debt per head of the population was £2 12s. At Middlesbrough there was a lower gas charge; the rate was 7s. 2d., and the debt £4 14s. per head. At Carlisle there was a lower gas charge, the rate was 5s. 6d., and the debt £3 8s. per head. At Burnley the gas charge was 2s. 6d. per 1000 feet, the rate was 5s. 2d., and the debt £3 2s. per head; and when they came to Leeds they found the gas charge 1s. 10d. per 1000, the population rated at 6s. 10d., and the debt per head £11 10s. The practical question was this—Was the reduction going to lead to a higher debt? If so, the Council should deal with it by rejecting the motion.

Alderman Gilpin favoured a reduction in price, which, to his mind, was justified by the profit made. Previous reductions had been followed both by an increase of consumption and an increase of profit. He thought if the price were reduced there would be a greater consumption of gas for domestic purposes.

Mr. Jacoby opposed the reduction. When they had a reserve-fund of £100,000 and began to reduce the price it would be business-like, but until then it would not.

Alderman Howitt gave some statistics as to the reductions which had already been made in the price of gas, commencing with 1874, when the price per 1000 feet was 3s. 0½d. and 3s. 4d., when there was a profit of £5000, and ending with 1880, when the price was 2s. 8d. and 2s. 10d., and they made £12,526. On this calculation he urged that the reduction was justifiable.

Mr. Bentley said he remembered the agitation in the town before the gas-works were taken over by the Corporation, and the inducement held out to the voters in the borough was that if the works passed into the hands of the Corporation they would have cheap and good gas. This argument alone strengthened the hands of the Corporation, or they never would have had the works up to the present time. It would appear that there were two constructions which might be put upon what was now proposed to be done; but by reducing the price of gas 2d. per 1000 feet the consumers would get the benefit more directly. The electric light was not likely to cause them any serious trouble, or supersede gas at present, so that there was no very pressing necessity for a large sinking-fund, and he thought that while coal was cheap the gas should be made cheap to the consumers also.

Alderman Thackeray, in reply, observed that it had been said that gas might be superseded by the electric light, and that therefore the Corporation should levy an extra charge upon the gas consumer. He would have no objection to this if the money were to go to a reserve-fund, but what was proposed by those who wished to keep up the price of gas was to levy an unfair tax on the gas consumer to relieve the rates, and not to accumulate a fund with which to extinguish the old capital of the Gas Company, which would be sound policy. No one in the course of the discussion had shown him any ground upon which they ought to levy a higher rate upon the gas consumer in order to meet contingencies, for if the use of gas was abolished, who would have to bear the burden but the large gas consumers? Making large profits out of gas was an indirect system of taxation, and he was much surprised that a Liberal Council should promote indirect taxation. If they wanted to levy rates, let them do it boldly and honestly. He had been told by Alderman Goldschmidt that he had done an injury by speaking of Leeds; but Leeds acted upon the right principle when it made gas as good as it possibly could, and supplied it upon the net terms to the consumer. That was doing perfectly right, and what would be the result for Leeds? The increase in the consumption of gas there would be something enormous in consequence of the low price charged, because gas was being used more and more every day, not so much for illuminating purposes as for domestic purposes. He had read the reports of the meetings of the various associations of gas engineers, and found that Mr. C. Hunt, presiding at one of them, explained that towns where the gas companies demanded a guarantee and deposit the consumption of oil was abnormally large, but that liberality, combined with caution, was certain to meet with a full reward, not only in the shape of assured profit, but also in the approbation of the consumers. He might say that Alderman Riley, Chairman of the Halifax Gas Committee, said at one of those meetings that a gratifying change in the administration and the finances of the Halifax Gas-Works, leading to a substantial reduction in the price of gas, might shortly be looked for. He (Alderman Thackeray) believed that Manchester had done a great deal of mischief by the way it had taken money out of the gas concern to relieve the rates. He thought the Council should be wise, and meet the gas consumers fairly and liberally, because these matters would get abroad, and gas consumers would naturally be dissatisfied if nothing were done; and they could not help it if they found that they were not only paying a full district rate, but, beyond that, had to contend with an increased price of gas. The gas consumers supplied the Council with the means to purchase and work the concern, and the Corporation ought to serve them with gas on the most reasonable terms. The price of coal was a most important element in the price of gas, and if the consumers of gas a few years ago had to pay a very high price because coal was dear, it was only right that when coal was cheap there should be a corresponding reduction in the price of gas; and in spite of this he dared guarantee that next year there would be a large profit, because even at this time and in this summer weather there was a consumption of 1 million cubic feet per week.

The motion was then put and carried, and the Council passed to other business.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

In both the coal and iron trades of this district, business continues very dull. The present position of the market may be described as one of anticipation; colliery proprietors are beginning to look forward to the approach of winter as one means of relieving the over-stocked market, and iron producers are rather waiting the working out of consumers stocks than forcing new sales at present.

In the coal trade prices generally continue extremely low, and although there is some hope that next month may see some upward movement in values, there is still a great deal of pressure to sell. Shipments of coal have been rather better during the past fortnight, but this has been only to a very moderate extent on the whole, and in other respects colliery proprietors experience no materially increased demand. Both best and common round coals are bad to sell, and average from 4s. 6d. to 5s. for steam and forge qualities, up to 7s. and 7s. 6d. per ton at the pit for good house-fire coals, with sellers at all kinds of prices between these figures. Engine fuel is tolerably steady, good burgy fetching 4s. to 4s. 3d., and good slack 3s. 3d. to 3s. 6d. per ton at the pit; but there are common sorts to be bought at much lower figures.

Coke is without material change, the demand being still very small and prices low.

In the iron trade makers of pig iron are chiefly engaged with deliveries on account of old contracts, very few new orders being booked at present. For delivery into the Manchester district, 49s. to 50s. per ton, less 2½ per cent., is the average price for Lancashire pig iron, and Lincolnshire and Derbyshire brands can be bought at the same figure, in some cases a trifle under. Bar iron makers are fairly busy, and local brands delivered into the Manchester district are steady at about £6 2s. 6d. to £6 5s. per ton.

THE SOUTH STAFFORDSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

A steady increase in the output of coal is one of the most favourable indications of the better state of trade in this district. The class referred to, however, is more particularly such qualities as are used by the local pig iron makers and finished iron manufacturers. The demand for best deep coals for household purposes continues to be on a limited scale. In the Cannock Chase district, where trade has been of a more favourable character throughout the past quarter, a better tone prevails, and at most of the collieries a fair tonnage for export and transit is being raised. Contract inquiries are, however, very scarce, and indications point to the probable fact that the majority of the summer and autumn contracts have been satisfactorily arranged. An average share is believed to have been placed in the South Staffordshire district, though the quotations returned are of an extremely low rate on the whole. In a few instances prices have been given which, even at the present low rate of remuneration paid for raising, will scarcely cover cost. Gas coals are plentiful, but only a limited inquiry exists. Furnace fuel and cokes of all classes are receiving a better call, and the market on the whole may be said to be steadily improving.

The iron trade maintains a more active existence than is usual at the end of the quarter. In most departments of both the finished and raw material a steady business tone prevails. Good orders have been booked by several houses for various descriptions of finished iron for the foreign market, more particularly for girder plates, hoops, rods, and strips. Bars of both best and second-class qualities are receiving better attention for export account. From Australia, the States, India, and the Cape, inquiries are reported by some of the leading houses. The local pig makers are steadily engaged, though no noteworthy increase in the number of furnaces in blast is returned. Part mine is selling fairly well at £3, whilst hot air is not receiving much attention; a few parcels of the latter changed hands during the week at prices averaging £3 10s. to £3 15s. Cinder pigs are quoted at £2 5s. Most of the foundries are doing more time per week than was reported at any period during the last quarter, though few only are fully employed. In the other miscellaneous branches of industry things are looking favourable, and show signs of a steady improvement.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The West Yorkshire coal trade exhibits no improvement, many of the pits still making an average of about three days per week. There is a very fair tonnage of steam coal forwarded to Hull and Goole, but from several places there was a decrease as compared with the month of July. A few of the pits in the Normanton district are doing a fair business in house coal for London, but the local trade is only quiet. A fair quantity of gas coal is being raised, which is for the most part supplied to local gas companies at prices similar to those which have been current during the past few months. At several collieries reductions are being demanded, whilst at the Kippax Colliery an amicable arrangement has been come to respecting the wage question.

The South Yorkshire coal trade continues in a very unsatisfactory state, the wages question giving rise to a good deal of anxiety. The Silkstone miners employed have left work at the Wharncliffe Silkstone Colliery, but the Parkgate men are still at work, and it is thought will continue. The demand for house coal for London is only quiet, but considering the short time worked a pretty good tonnage is being sent over the Midland and Great Northern lines. Most other markets exhibit a remarkably quiet tone for this season of the year, when merchants are generally inclined to stack coal for winter. The collieries vary a great deal; in fact, more so than for years past. The Manvers Main Colliery, where 800 men and boys are employed, are making almost full time. The same may be said with respect to the Denaby Main Colliery near Mexborough, where about 1300 tons of coal per day is being raised. These and a few other pits are exceptions to the rule, as most of the pits are not making more than three or four days per week.

There is a very fair business doing in steam coal for Grimsby, some of the leading merchants shipping there being shareholders in local collieries. The quantity sent to Hull, although not so large as it was, is good. Denaby Main last month forwarded the largest tonnage of any Yorkshire colliery trading with Hull, having sent 11,792 tons. Other South Yorkshire collieries did very well, considering the competition which has to be met.

Those pits which raise a good quality of gas coal are enjoying a fair share of patronage. The Silkstone collieries are doing better than some of the thick-seam pits, owing to the coal yielding more gas, and being supplied at a cheaper rate than was the case a few years ago. A fair tonnage is being sent to Nottingham and other places in the Midlands, as well as to the Eastern Counties.

Other kinds of fuel, including small coal and slack for manufacturing purposes, are only in moderate request, and prices, if anything, are rather easier. The coke trade holds pretty well up; but neither the demand nor the output is so large as it was. There is rather a falling-off in the tonnage sent to North Lincolnshire, where 14 out of the 20 erected stacks are in blast. Within the past few days there has been a rumour in circulation that the Midland Railway Company are about to make a reduction of 1s. per ton on coke sent to Blackwall for steamer purposes, and this has somewhat checked sales, it being believed that if a concession is made it will become pretty general.

The labour market, as before intimated, is much disturbed. The Barrow colliers have arranged their dispute, but those employed at Wheatley Wood are still out. In view of securing greater unity of the men, a conference of representatives from Yorkshire miners lodges is fixed to be held at Barnsley to-day (Tuesday), when the delegates will be asked to consider "the best and surest means of preventing reductions" as well as "the present position and prospects of South Yorkshire miners."

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The public of the North have been a good deal excited over the frightful catastrophe that has occurred in the gas colliery at Seaham. It is a large pit, and the coals shipped have generally been placed on board small sailing vessels at Seaham Harbour for the gas-works in the bye-ports. It will be a long while before work is resumed there.

The general gas coal trade continues active. The demand is very well sustained, and the shipments are considerable. Sailing ships were inquired after in the latter part of last week to take coals to Ireland at an improvement of about 6d. per ton on freight. There are no reports of many contracts having been made for the ensuing season, so far. It is not probable, as I have previously reported, that the coalowners will secure much advance in prices. There are too many coals in the market for that, and second-class pits keep rather scant of work. The house coal trade is a little better, as we begin to draw towards the cold weather. Steam coals are in moderate request. The coal offices in this trade have a great difficulty in maintaining prices as they are, without seeking an advance. Coke is being shipped pretty freely to the Baltic, mostly on account of the contractors, however, who have to complete their transactions before the close of the season. Freights for Cronstadt advanced 6d. to 9d. per ton last week, on account of the inquiry for boats for this purpose.

The general trade of the North of England last week was very little changed from the previous week. A fair quantity of goods are sent abroad, and are also bought in the home market; but the complaint is universal amongst manufacturers that the competition is so keen in the market that they have the greatest difficulty in realizing a profit on their transactions. The iron trade is moderate, especially manufacturing. The chemical business keeps very dull. Prices were a shade lower last week.

SALE OF GAS SHARES AND BONDS AT GREAT YARMOUTH.—Last Thursday evening Messrs. Spelman sold by auction 64 £7 10s. shares in the Great Yarmouth Gas Company, which realized an average of £12 10s. per share; 40 £30 shares in the same Company realized an average of £45 per share; and 6 bonds of £50 each in the Gorleston and Southtown Gaslight and Coke Company sold for £51 per bond.

EXPLOSION OF A GASOLINE APPARATUS IN BERLIN.—A gas-making apparatus exploded in a Berlin *Bierhalle* on the 5th ult., in consequence of a leak which permitted the escape of the gasoline. The apparatus had only been in use a fortnight previous to the explosion, and the escaped fluid ignited in consequence of the incaution of an attendant who was not aware of the explosive nature of the gasoline. Four men were killed, and eight others badly injured by the explosion.

HARTLEPOOL GAS AND WATER COMPANY.—The annual general meeting of this Company was held on the 31st ult.—Mr. T. R. Holmes in the chair. The Directors report which was presented was taken as read, and the Chairman, in moving its adoption, congratulated the Shareholders generally on the favourable position of the Company. The dividend was, perhaps, not so large as some of them could have wished; but, under existing circumstances, it was as much as the Directors could conscientiously recommend. The new gasholder was finished, and the purifying and storeage capacity had been made equal to about three-quarters of a million cubic feet of gas per day. The report was adopted, a dividend of 6½ per cent. declared, and the retiring Directors and Auditor were re-elected. The thanks of the meeting were accorded to the Chairman for his services to the Company, and acknowledged by him, and the proceedings then closed. It may be mentioned that the total quantity of water sold by the Company during last year was 425,978,900 gallons, an increase of 33,859,700 gallons as compared with the consumption ten years back. The consumption of gas last year was 102,916,900 cubic feet, and in 1870 it was 68,420,200 feet.

THE GAS SUPPLY OF DUNEDIN (N.Z.).—Extensive additions and improvements to the Dunedin Gas-Works which are contemplated, and a portion of which are in course of construction, will, we learn, fully meet the requirements of the city for some years. The quantity of gas now required for Dunedin and supplied to it is more than five times as great as it was in 1872. In the year mentioned the quantity manufactured was 12 million cubic feet, and this year it will be between 65 million and 75 million cubic feet, which will be about the maximum production of the present retort-house. To meet, therefore, an anticipated increase in the consumption, a portion of a second retort-house will be erected during the ensuing summer. This addition when completed will be 120 feet in width between the walls, and will be covered with a three-span roof. The retort-benches will occupy the central portion of this house, and will be covered by a span of 60 feet, while the two outer spans of 30 feet each will cover the coal stores, &c. Through each shed the coal will be run on an elevated railway, and by this means a considerable saving will be effected in the cost of discharging. Through retorts will be used; they will be 20 feet in length, and will be charged from each side of the benches.

WINCHESTER GAS AND WATER COMPANY.—The half-yearly general meeting of this Company was held on the 26th ult., when the Directors report on the operations of the Company for the past half year was presented. It stated that the Company's business had been satisfactory, and the working account showed a balance of £6163 17s. 11d. The Directors recommended that a dividend of 10 per cent. per annum be declared for the half year, less income-tax, and that £500 be placed to the reserve account, which would then amount to £4346 18s. 10d. The Directors added that great progress had been made with the new gasholder and tank, and that the whole of the work was very near completion. An extraordinary meeting of the Shareholders was also held for the purpose of receiving the Directors report on the subject of authorizing the raising of additional capital. This report stated that in consequence of the recent outlay in the construction of the new gasholder and tank, they recommended that the 460 shares, being the remainder of the capital authorized by the Company's Act not yet called up, should be issued to the Shareholders as far as possible *pro ratâ*, and that a call of £5 per share should be made payable on the 1st of October next.

PONTYPRIDD WATER-WORKS COMPANY.—The accounts of this Company for the half year ended June 30 last show the expenditure on capital account during the six months to have been £77 8s. 6d., thus increasing the grand total to £3792 11s. 7d. Received, £293; making the whole receipts since the outset £36,290 12s., and leaving a balance on this side of the account of £2638 16s. 7d. In the revenue account the expenditure was £1316 14s. 9d., against £1037 9s. 6d. in the preceding half year. This increase was principally to be attributed to the repairs and maintenance of mains, which cost £275 0s. 5d. in the last half year, against £35 4s. 3d. in the previous half. Service-pipes, the figures respecting which were £232 2s. 8d. in the first half of 1880, cost £160 9s. in the second half of 1879; £472 0s. 1d. was transferred to meet revenue account, against £475 6s. 5d. in the previous half year. The water-rates for the June half year, on the other hand, amounted to £917 9s. 4d., against £889 17s. 7d. in the December half, and the receipts for service in 1880 were £361 0s. 6d., against £197 11s. 11d. The stores in hand were £278 8s. 8d., and sundry debtors owed £489 8s. 3d. The other important figures to be noted are—balance of net revenue account, £730 11s. 1d.; due to London and Provincial Bank, £258 5s. 6d.; unpaid dividends, £54 0s. 9d.; sundry creditors, £2525 9s. 7d.

BIRKENHEAD GAS AND WATER SUPPLY.—At the last monthly meeting of the Birkenhead Town Council—the Deputy-Mayor (Mr. T. S. Deacon in the chair)—a report was read from a Special Sub-Committee of the Gas and Water Committee, appointed to consider and report upon a resolution of the Parliamentary Committee with reference to the division of the capital of the gas and water undertaking into the sums belonging respectively to gas and water; the appropriation of the surplus income in reduction of local rates, and partly in reduction of the price of gas and water; the taking over of the Tranmere Water-Works and proposed extension as part of the supply of the borough; and with regard to additional borrowing powers, regulations, &c. The Special Committee recommended, amongst other things, the amalgamation of the Tranmere with the Birkenhead and Claughton Water-Works, a further extension of works for water supply, further extensions of gas-works, and the acquirement of powers "to manufacture and supply within the district electric light or any other illuminant than gas which may come into general use, and which may supersede gas, either for public or private lighting;" and to supply gas in the district of Noctorum and water in the township of Bidston. After a short discussion the Council approved the report, and agreed to refer it to the Parliamentary Committee.

REDUCTION IN THE PRICE OF GAS BY THE ROSSENDALE UNION GAS COMPANY.—On Thursday, the 2nd inst., a deputation, consisting of representatives of the Local Authorities and others supplied by the Rossendale Union Gas Company, waited upon the Directors, to present a numerously signed memorial from the principal gas consumers in the district, soliciting them to take into consideration the present high charges made by the Company for gas—4s. 5d. per 1000 cubic feet—and asking for a substantial reduction. The Chairman of the Company (Captain Aitken) said the Directors were of opinion, from the returns which they had received from other Companies of a similar extent and character, that the prices charged in their district were not really higher than in others, and with reference to the charges made to the public bodies for the lighting of the lamps, the Company could not possibly reduce them. He referred to the large capital the Company had invested, and said that in consequence of the depressed state of trade and the reduced consumption of gas consequent thereon, they had experienced great difficulties. The deputation, who were very courteously received, were afterwards informed that the Directors had decided to reduce the price to general consumers 3d. per 1000 feet, but could not possibly reduce the price charged to public bodies for public lighting. The deputation thanked the Directors and retired.

FARNWORTH AND KERSLEY GAS COMPANY.—The half-yearly meeting of this Company was held on Wednesday, the 25th ult., and from the report of the Directors, which was then presented, it appeared that the cost of the manufacture of gas and its distribution had, during the six months ended the 30th of June last, been £2541 5s. 5d.; in rents, rates, and taxes there had been expended £277 9s. 11d.; the management expenses were £317 8s.; law charges, £29 4s. 1d.; depreciation of buildings, plant, mains, &c., £769 3s. 4d.; and bank interest and compensation, £8 12s. 6d.; leaving a balance to be carried to profit and loss account of £2851 6s. 5d. For the sale of gas and rental of meters there had been received during the half year, £5865 17s. 11d.; for residual products, £806 6s. 11d.; rents of cottages, £48 19s. 2d.; and for meters and fittings, £73 5s. 8d. The profit and loss account showed a balance of net profit to be carried to next account, subject to six months dividends to the 30th of June last, of £5177 9s. 3d. The expenditure up to the end of last year was given at £61,532 16s. 4d., and from this was deducted £769 3s. 4d., depreciation during the past six months, charged against revenue account. During the same period £120 14s. 8d. had been spent upon plant and new buildings, the expenditure thus being £60,884 7s. 8d., which was returned as £61,500, an addition of £615 12s. 4d. being made as balance of capital account. The balance in the hands of the bankers, according to the general balance-sheet, was £1926 19s. 4d.

THE LIGHTING OF COURTS IN LIVERPOOL.—At the last meeting of the Liverpool City Council, Mr. P. H. Rathbone moved the adoption of the following recommendation of the Watch Committee:—"That the lighting of the courts in the parish of Liverpool be at once proceeded with, and that the cost (including that of the lamps and other requisite apparatus) be provided from the same source as that from which the cost of the public lighting of the city is now provided." He remarked that in consequence of the courts not being lighted, it was positively dangerous for the police to go into them when a disturbance occurred. As the lighting was for the public benefit, it was only right that the cost should be defrayed out of the same source as that which provided for the lighting of the streets. Mr. Holt seconded the motion. A memorial was read from the Land and House Owners Association protesting against the expenditure of £15,800 in affixing the lamps for the lighting of 2560 courts. Dr. Commins, M.P., did not see the advantage to be gained by expending £15,000, and said that in the course of 20 years experience he had never known a single instance where the lighting of courts prevented crime. After some further discussion the Council unanimously accepted the recommendation of the Committee in the following amended form:—"That the lighting of the courts in the city of Liverpool be at once proceeded with; that the cost be provided from the same source as that from which the cost of the public lighting of the city is now provided; and that in executing the work precedence be given to the cases of those courts which are reported by the City Engineer as being most in need of light."

NORMANTON GAS COMPANY.—The half-yearly general meeting of this Company was held on the 21st ult.—W. Statter, Esq., J.P., in the chair. The Secretary (Mr. Armitage) having read the notice of meeting, the Chairman said that he regretted the Directors had not quite so good a report to present to the Shareholders as last half year. The works were in good order, but the mains were faulty, and the leakage was consequently high—25 per cent. The total income of the Company for the half year was less than for the previous half year, and this had been owing to the Company having to make some concession in order to secure a new contract with the Midland Railway Company. He then went through the accounts in detail, pointing out that the income had been £200 less than usual, and that the Company had had to pay £50 more for rates. The illuminating power of the gas had been kept up to nearly 18 candles, and the quantity sold had been 6,413,000 feet. The profit on the half year would allow of the payment of a dividend of 6 per cent. The Directors thought, however, that with their large reserve-fund of £1099, they might declare a dividend of 7 per cent., by taking £167 from that fund, and this would leave £932 still in reserve. He therefore proposed that a dividend of 7 per cent., free of income-tax, be declared. Mr. Shaw seconded the motion, and it was carried. The retiring Directors, Messrs. Walker and Lodge, were re-appointed, and the proceedings terminated with a vote of thanks to the Directors.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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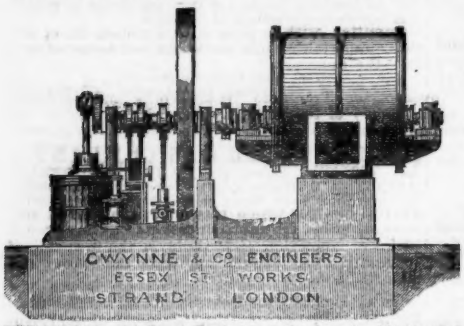

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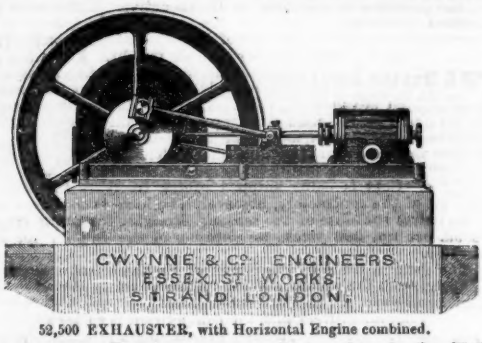

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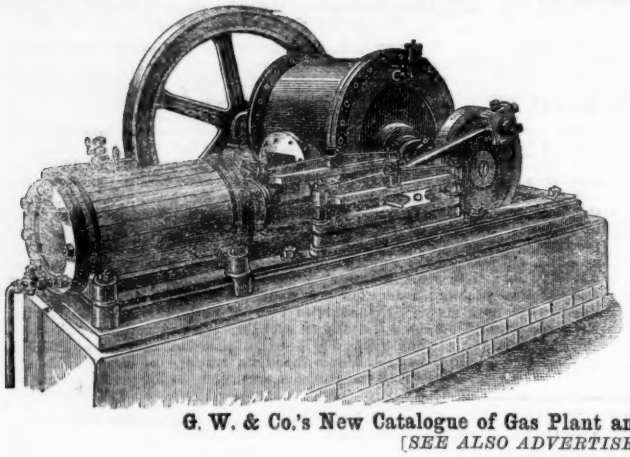

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[*SEE ALSO ADVERTISEMENT, PAGE* 438.]

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Votes thankfully received by Bro. MAGNUS OHREN, Lower Sydenham, KENT, S.E.

WANTED, a Situation as Gas-Fitter. Is used to Service-Laying, Compo Fitting, Meter Fixing and Indicing, and Repairing Street Lamps.

Apply, stating wages, to M. BATHER, BRECON.

WANTED, a Situation as Engineer or WORKING FOREMAN of a small Water-Works. Understands Pump Work, Main and Service Laying, &c. Good references.

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WANTED.—The Advertiser, a Young Man, aged 39, married, is open for an Engagement as MANAGER and SECRETARY of a medium-sized Gas-Works, or SUB-MANAGER of a large Works. Has a thorough Knowledge of the Manufacture and Distribution of Gas in all its branches, having had sole management of Gas-Works for 16 years. Highest testimonials and references.

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WANTED immediately, a Steady Man as STOKER. Constant employment to a good man.

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WANTED, by a Young Man, a Situation in a Gas Company's Office. Understands the general routine. Neat writer. Excellent character. Wages moderate.

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For particulars, apply to Mr. JACKSON, Manager, Gas-Works, Spilsby, LINCOLNSHIRE.

TISBURY GAS AND COAL COMPANY.

WANTED, by the above Company, a WORKING MAN capable of Making Gas, Laying Services, doing Repairs, and attending to Weighing Out and Selling Coals, &c.

Apply to Mr. H. COLLINS, Gas-Works, Tisbury, WILTS.

TO GAS-WORKS MANAGERS.

WANTED, a Working Manager for a small Gas-Works in the West of England, where the annual make is about 3 million cubic feet. No one need apply who cannot refer to works he has already successfully managed. State age, number in family, and send copies only of testimonials, extending over the past four years. Wages 25s. per week, with house, coal, and light free.

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WANTED, by the Bath Gaslight and Coke Company, a GENERAL FOREMAN, who must possess a thorough practical Knowledge of the Manufacture of Gas and the various Apparatus and Machinery used in Gas-Works.

Applications, stating age, experience, and wages required, to be addressed to the undersigned not later than Monday, the 20th of September inst., and to enclose three testimonials of recent date.

By order,
C. STAFFORD ELLERY, Engineer.

WANTED at once, by the Shrewsbury Gaslight Company, a thoroughly efficient General FOREMAN, who understands the Manufacture of Gas and the Plant and Machinery connected therewith. None but those whose characters will bear strict investigation need apply.

Applications, in own handwriting, stating age and qualifications, to be sent to the undersigned, and to be accompanied by recent testimonials.

A married man without family preferred. Wages 32s. per week, with house, coals, and gas.

By order,
WM. BELTON, Secretary and Manager.
Gas-Works, Shrewsbury, Aug. 20, 1880.

FOR SALE.—In consequence of the decease of Mr. Milne, a GAS-WORKS in a small Manufacturing Town in Ulster. Present make 1¼ millions, which might be increased.

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THE Elsecar Gas Company, near Barnsley, have FOR SALE the following PLANT (Thorncliffe patterns and make):—

3 Ash-Pans, with 3 furnace-doors, frames, and fire-bars.
11 Mouthpieces, 15 in. by 13 in.
11 Flange and Socket Pipes to fit.
11 Spigot-Pipes.
11 Arch-Pipes for same.
3 lengths Hydraulic Main, one for five retorts, and two for three retorts.
22 Mouthpiece Doors.
11 Door-Screws.
1 Condenser, with tar-box and 16 6-in. pipes.
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1 Scrubber, with dry-faced bye-pass, water distributor, and grates, all 6-in. connections.

To be sold cheap, and application to be made to Mr. H. C. OATES, at the Elsecar Gas-Works, or to THOS. WEYFIELD, Secretary, High Street, ROTHERHAM.

ON SALE—The Cast-Iron Fire Doors, Mouthpieces, Ascension, H, and Dip Pipes, Hydraulic Mains, &c., belonging to six settings of six retorts; One Station Meter to pass 8000 feet per hour (makers West and Gregson); also nine D-shaped clay retorts, 16 in. by 14 in. by 8 feet.

The above are in capital condition, and can be seen at the Gas-Works, Guildford. No reasonable offer refused.

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28 Mouthpieces—Lids, 20 in. by 14 in.; 40 ft. of Hydraulic Main and all Connections complete.

A Condenser, consisting of 16 6-in. and four 10-in. Vertical Pipes and 12-in. Receiving Mains.

A Whimster's Exhaust Washer to pass 12,000 ft. per hour, with Engine, Bye-Pass, Throttle Valve, and Governor complete.

Four Purifiers, 8 ft. by 8 ft. by 4 ft, 6 in., Wood Grids and Dry Centre-Valve and 8-in. Connecting Pipes.

Station-Meter to pass 6000 ft. per hour, with 8-in. Connections and Bye-pass complete.

Gasholder, 50 ft. by 16 ft., Six Columns, Girders, &c.

Boiler and Fittings complete, 10 ft. by 3 ft. 6 in.

For further particulars apply to Mr. Geo. Smedley, Sen. Engineer, Gas Office, Buxton.

By order,
JOSIAH TAYLOR, Clerk.

Buxton, Aug. 21, 1880.

LOANS.

A Small old-established Provincial Gas Company, secured by Provisional Order, and having a clear net income of £800 per annum, is desirous of BORROWING a sum of £3500 at 5 per cent. per annum on Debenture Stock, to be laid out in Extensions of the Plant, the Stock to be transferable in sums of Five pounds, or any multiples thereof. No Debenture Stock or Bonds having been issued up to the present time, this Stock will be the first charge upon the undertaking.

Applications to be made before the 1st of October next to W. LIVESEY, 6, Victoria Street, WESTMINSTER, S.W.

THE Directors of the Rochester, Chatham, and Strood Gaslight Company are prepared to receive TENDERS for the Erection of Four PURIFIERS with all necessary Valves, Connections, and Lifting Gear, according to specification which may be had on application, and drawings, which can be seen at their Office, 56, High Street, Rochester.

Sealed tenders, endorsed "Tender for Purifiers," to be delivered at the Office as above, before noon of Thursday, Oct. 14.

By order,
WILLIAM SYMS, Secretary and Engineer.

Sept. 2, 1880.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their Surplus TAR, for One year from the 1st of October next. Probable quantity from 140,000 to 160,000 gallons. Delivery on Company's Works, filled into purchaser's tanks. Payments, cash monthly.

Sealed tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Monday, the 27th of September next, but the Directors do not bind themselves to accept the highest or any tender.

W. A. PADFIELD, Secretary.

Gas Offices, North Street, Exeter, Sept. 7, 1880.

LEEDS CORPORATION GAS-WORKS. TENDERS solicited for the Supply of Wrought-Iron TUBES for a period of Twelve months. Sample bundles of ¾-in. to be sent to Mr. W. Woodall, Gas-Works, Meadow Lane, not later than Wednesday, the 22nd inst.

Tenders to be sent not later than Monday, the 27th inst., addressed to the Chairman, Gas Offices, Boar Lane, and endorsed "Tender for Tubes."

The lowest or any tender will not necessarily be accepted.

THE Directors of the Farnworth and Kearsley Gas Company are prepared to receive TENDERS for the Surplus TAR and AMMONIACAL LIQUOR produced at their Works, together or separately, for the term of One, Two, or Three years.

Tenders, sealed and endorsed, to be addressed to the Chairman, J. Warburton, Esq., and sent on or before Saturday, Sept. 25.

Any further information may be obtained from the Manager,

T. L. SHEPPARD.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—

About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.

Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.

Exhauster (Jones) to pass about 15,000 feet per hour.

Exhauster (Beales) to pass about 25,000 feet per hour.

Two Vertical Steam-Engines, each about 6-horse powe with Pulleys, and Shafting used for driving the above.

Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.

4-horse power Horizontal Steam-Engine.

Three 4-in. Pumps, with cranked Shafting and a pair of Mitre Wheels.

Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.

Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.

Gasholder, Double Lift, capacity 100,000 feet.

Gasholder, Double Lift, capacity 240,000 feet.

One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.

Two 12-in. four-way faced Valves, by Cockey.

For further information, &c., apply to the undersigned.

R. MORLAND, Engineer.

CITY OF LIVERPOOL.

TO PIPEFOUNDERS.

THE Council of the City of Liverpool are desirous to receive TENDERS for the Supply of about 8000 Tons of Cast-Iron SOCKET-PIPES and other Articles connected therewith.

Drawings and specifications may be inspected at the Office of the Water Engineer, Municipal Offices, Liverpool, on and after Monday, the 13th of September inst., where copies may also be obtained, at the cost of two guineas each, to be returned to any person or firm from whom a *bona fide* tender shall be received.

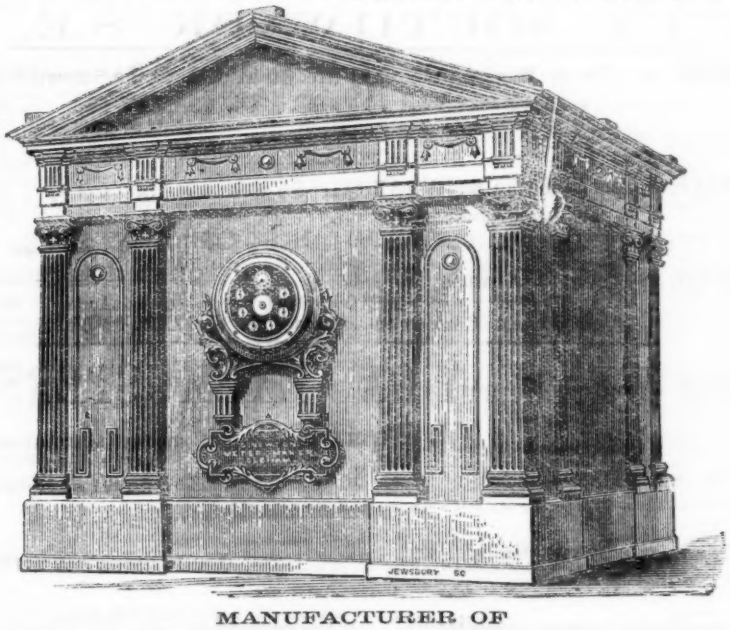
Tenders are to be delivered at my Office, in Liverpool, on or before Wednesday, the 29th of September inst.

The Council do not undertake to accept the lowest or other tender.

By order,
JOSEPH RAYNER, Town Clerk.

Liverpool, Sept. 7, 1880.

GEORGE NEWTON,
UNION STREET WEST, OLDHAM,



MANUFACTURER OF

SQUARE STATION-METERS, with PLANED JOINTS;
ROUND STATION-METERS, WITH CAST-IRON STANDS;
WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

THE BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office on WEDNESDAY, the 29th inst., at One o'clock precisely, to transact the usual business, to declare the Dividend for the Half Year ending the 30th of June last, and to elect two Directors and one Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.

Notice is hereby also given that the Transfer Books of the Company will be closed on the 17th, and re-opened on the 30th inst.

By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.

Chief Office, No. 11, George Yard, Lombard Street, London, E.C., Sept. 8, 1880.

COMMERCIAL GAS COMPANY. NOTICE is hereby given that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 1st of October, 1880, at Twelve o'clock at Noon, to receive the Report of the Directors, to declare a Dividend, to authorize the Directors to make arrangements for the retirement of the Company's Senior Engineer, and for other business.

The Books will be closed for the transfer of Stock from the 18th of September inst. to the 1st of October next, both days inclusive.

By order of the Board,
H. D. ELLIS, Secretary.

Offices, Stepney, Sept. 3, 1880.

TOTTENHAM AND EDMONTON GAS COMPANY.

NOTICE is hereby given that the ANNUAL ORDINARY GENERAL MEETING of SHAREHOLDERS in this Company will be held at the Works, Willoughby Lane, Tottenham, on Saturday, the 25th day of September inst., at Three o'clock in the afternoon precisely, to receive the Report of the Directors, the Statement of Accounts for the Half Year ended the 30th of June, 1880; to declare Dividends; and for the election of two Directors and an Auditor for the ensuing year, Messrs. George Gripper and John Malcolm being the Directors, and Mr. Alexander Nicol the Auditor, who retire by rotation, and, being eligible, offer themselves for re-election; and for transacting such other business as the Act of Parliament directs.

The Transfer Books will be closed on Friday, the 10th inst., until after the meeting.

The Dividends to be declared will be payable on and after Monday, the 27th inst.

At the close of the Annual Ordinary General Meeting the EXTRAORDINARY MEETING of SHAREHOLDERS, adjourned from the 31st of July last, will be held.

By order of the Board of Directors,
JAMES RANDALL, Secretary.

Offices, Edmonton, Middlesex, Sept. 10, 1880.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Brighouse Local Board are prepared to receive TENDERS for the Surplus GAS TAR and AMMONIACAL LIQUOR produced at their Gas-Works for One, Two, or Three years, from the 1st of October next.

Quantity of Tar made per annum 230 tons, and of Liquor 370 tons or thereabouts. Storeage capacity, 110 tons.

Sealed tenders, stating the price per ton on the Works, must be sent in on or before Thursday, the 16th of September inst., addressed to John Carr Bottomley, Esq., Chairman of the Local Board, Gas-Works, Brighouse, and endorsed on the outside "Tender for Tar" or "Liquor," as the case may be.

The Local Board do not bind themselves to accept the highest or any tender.

Further particulars may be had upon application to the undersigned.

By order,
JAMES PARKINSON, Manager.

Gas-Works, Brighouse, Sept. 3, 1880.

TO ENGINEERS AND IRONFOUNDERS.

THE Corporation of Birkenhead invite TENDERS for the Construction of Six Cast-Iron PURIFIERS, with Centre-Valves and Connecting-Pipes to same.

Specification and drawings may be seen at the Gas and Water Offices, 50, Hamilton Square, where form of tender, together with any other information, may be obtained from Mr. Paterson, the Gas-Works Engineer.

Sealed tenders, endorsed "Purifiers," and addressed to the Chairman of the Gas and Water Committee, Birkenhead, must be sent in on or before the 17th inst.

The Corporation do not bind themselves to accept the lowest or any tender, and no tender will be considered by the Committee unless sent in on the form provided for that purpose.

By order,
AMBROSE WALN, Town Clerk.

Municipal Offices, Birkenhead, Sept. 7, 1880.

ALEXANDRA PALACE.

LIGHT EXHIBITION AND MART.

September 27 to October 9, 1880.

ENTRIES CLOSE SEPT. 20.

SECTION A.

Class 1. Motors suitable for Driving Dynamo Machines.
Class 2. Dynamo Electric Machines.
Class 3. Electric Lamps and Carbons.
Class 4. Photometers especially applicable to Electric Light Measurement.
Class 5. Miscellaneous Electrical Apparatus for Sale.

SECTION B.

Class 1. Gas Apparatus, including Portable Gas-Works, Fittings, Burners, &c.
Class 2. Candles of all kinds.
Class 3. Petroleum and Oil Lamps, and all applications of Petroleum and Oil to Lighting purposes.
Class 4. Miscellaneous Apparatus not included in any of the above, as Gas-Stoves, Oil-Stoves, Reflectors, &c.

For forms of entry, &c., apply to Mr. G. GROUT, ALEXANDRA PALACE, N.

MR. CORBET WOODALL, C.E.,

Has Removed his Office to

PALACE CHAMBERS, BRIDGE STREET,
WESTMINSTER, S.W.

STOCK OF THE BRISTOL UNITED GASLIGHT COMPANY.

MESSRS. H. R. FARGUS & CO. will Sell by Auction, in pursuance and under the provisions of the Bristol United Gaslight Company's Act, 1873, at their Sale-Room, 4, Clare Street, in the City of Bristol, on Thursday, Sept. 16th, 1880, at Two o'clock precisely, £20,000 CAPITAL STOCK, issued by them under the authority of the above-named Act.

The Stock will be Sold in Lots of £100 each.

For conditions of sale and any further particulars, apply to the AUCTIONEERS, Clare Street, BRISTOL; to the SECRETARY of the Company, Canons Marsh, BRISTOL; or to Messrs. BRITTANS, LIVETT, AND MILLER, Solicitors, Albion Chambers, BRISTOL.

CHESTER UNITED GAS COMPANY.

Sale by Tender of £10,000 of Ordinary Stock, being a portion of the additional Capital authorized to be raised by Resolution passed at a General Meeting of Proprietors, held on the 9th of August, 1880, in pursuance of the powers of the Chester Gas Act, 1880.

THE Directors of the Chester United Gas Company give Notice that they will be prepared to receive, not later than Ten o'clock a.m., on Thursday, the 7th day of October, 1880, sealed TENDERS for £10,000 of ORDINARY STOCK, bearing a maximum dividend of £7 per cent., in Lots of £100 each nominal value.

The Capital now offered is required for the Extension of the Company's Works, to enable them to meet the increased demand for Gas.

Forms of tender can be had at the Offices of the Company, at the Roodee, Chester, or will be sent by post on application.

By order,
JAMES PYE, Secretary.

Gas Offices, Roodee, Sept. 6, 1880.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

Price 28s. each, handsomely bound in Morocco, cloth sides, gilt edged and lettered.

THE FIRST AND SECOND VOLUMES
OF

KING'S TREATISE

On the Science and Practice of the Manufacture and Distribution of

COAL GAS.

Edited by THOS. NEWBIGGING, C.E., M.Inst.C.E. and W. T. FEWTRELL, F.C.S.

Orders received by
WALTER KING, 11, Bolt Court, Fleet Street, London, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

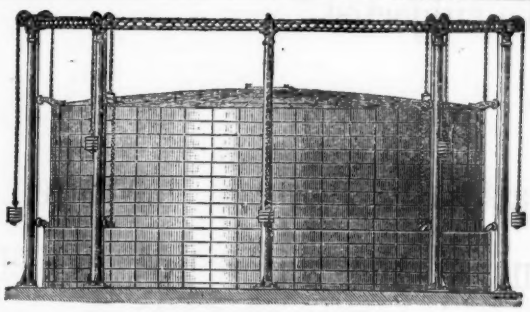
RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.



J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

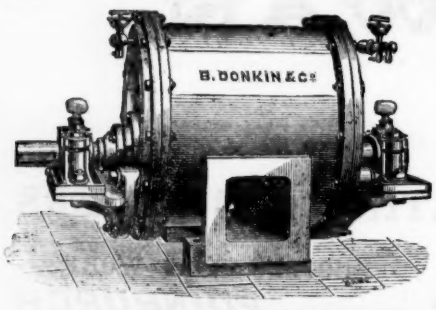
LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.



NEW PATENT GAS-EXHAUSTERS.

[J. BEALE'S.]

MESSRS. B. DONKIN & Co. possess the sole right to manufacture J. Beale's Exhausters under his new patent.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

ALSO MANUFACTURERS OF

IMPROVED GAS AND WATER VALVES, STEAM-ENGINES, &c., &c.

B. DONKIN & CO., BERMONDSEY, LONDON.

THE

WARNER & COWAN METER.

EXTRACTS FROM THE SIXTH EDITION OF "HUGHES ON GAS-WORKS."

"Innumerable patents have been obtained at various times for improvements in the Wet Meter, and of these the most important is unquestionably the invention of Messrs. Warner and Cowan, by which the instrument is practically correct in its measurement under all the changes of water level to which it may be subjected."

* * * * * * *

"Practically correct measure is assured under all the variations of the water line, which permits of a large range for the float, and avoids the chances of extinction by no means uncommon with other Meters, particularly those of small capacity, and which is effected without any auxiliary beyond the wheel of the Meter."

W. & B. COWAN,

(ESTABLISHED 1827,)

ORIGINAL LICENSEES AND MANUFACTURERS OF

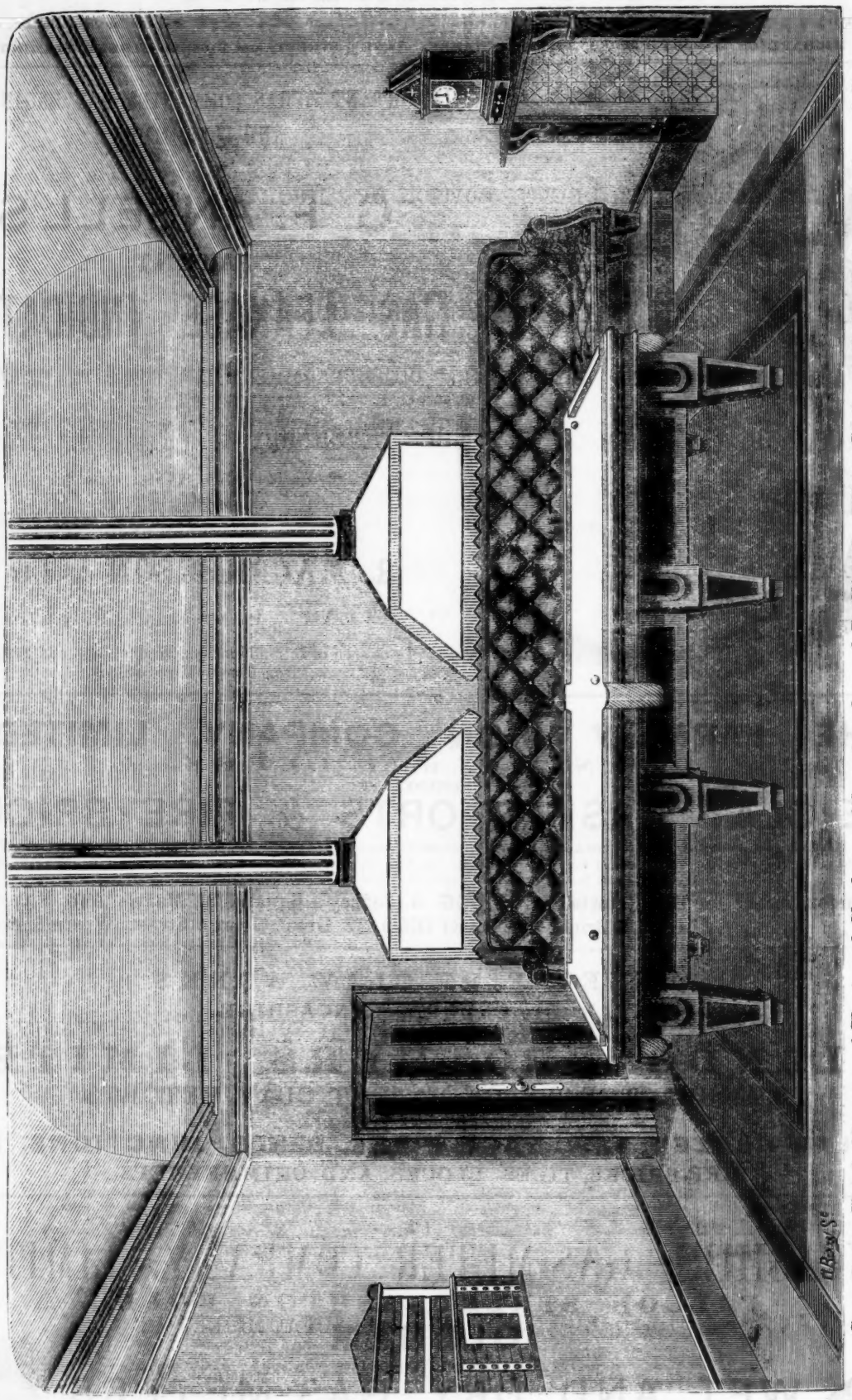
WARNER & COWAN'S SELF-REGULATING GAS METERS,

CHURCH ST., MILLBANK ST., *LONDON, S.W.* | DUTTON ST., NEW BRIDGE ST., *MANCHESTER.* | BUCCLEUCH ST. WORKS, *EDINBURGH.*

THE LATEST NOVELTY

FOR THE EFFECTIVE LIGHTING of BILLIARD TABLES.

BILLIARD TABLE LIGHTING BY WILLIAM SUGG'S PATENT SELF-VENTILATING SYSTEM AND BURNERS OF HIGH ILLUMINATING POWER,



Securing a Total Absence of Heat and Shadow, with a Steady and Brilliantly White Light, and Small Consumption of Gas.

N.B.—All products of combustion are carried away into the open air, and cannot, therefore, mix with and vitiate the atmosphere of the room.

One of the above has been fitted up in the Billiard-Room of the Raleigh Club, Regent Street, and the Secretary states that the Table is the best lighted he has ever seen.

APPLY TO

WILLIAM SUGG,

VINCENT WORKS, WESTMINSTER, & GRAND HOTEL BUILDINGS, CHARING CROSS.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

IMPORTANT TO GAS COMPANIES, GAS ENGINEERS, AND CONSUMERS.

G. F. ANSELL'S

PATENT

GAS LEAKAGE INDICATOR,

A SAFE AND CERTAIN SUBSTITUTE FOR A LIGHT, rendering Risk of Explosions unnecessary. Easily understood, and always to be relied upon. (See article in the JOURNAL for Sept. 7, page 374.)

Price £3 15s. each.

SOLD ONLY BY

R. MACPHERSON & CO.,

9, COAL EXCHANGE, E.C.

To be seen in action Mondays, Wednesdays, and Fridays, from Two to Three o'clock.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.

,, ,, Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES BLOCKS, AND CHIMNEY-TOPS.

THE

LANCASHIRE GAS-METER COMPANY, LIMITED,

FALCON STREET, ASHTON ROAD,

OLDHAM

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

LAMP GOVERNORS & TAPS, PRESSURE-GAUGES, MAIN THERMOMETERS,

ETC., ETC.

The understated declaration with which we introduced our apparatus when the Argand system was in the full tide of its fame, has been fully borne out by general experience, namely—

"THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING; and, 'in actual use,' yields as much light with Common Gas, and more with Cannel Gas, than any Argand System."

CHARLES HUNT, Esq. (President of the British Association of Gas Managers), in his Inaugural Address to the members at their annual meeting, held in London, June, 1880, said: "Rivalry has stimulated into being, for outdoor purposes mainly, Burners of large power, that have fully maintained the superiority of coal gas over the electric light. To Mr. Bray our thanks are due for his development of the **FLAT-FLAME BURNER** into a lighting medium of a very high order, *and for his vindication of its claims to practical consideration.*"

The above declaration was received with marked applause by the crowded meeting.

BIRMINGHAM LAMP TESTS.

AFTER the most exhaustive series of experiments, extending over more than twelve months, with the most extensive assortment of Burners and Lanterns of large lighting power ever brought together, the Birmingham Authorities have

ADOPTED BRAY'S SYSTEM

for their Street-Lighting Improvements, for which purpose Sixty-Five 100-candles power Lanterns of medium lighting power are being fixed.

The apparatus used in the above tests were all of our usual medium lighting power class, and the tests showed that we sacrifice a considerable amount of lighting power for general efficiency. The tests further showed that our 80*-candles* HIGHEST *lighting power burner yielded* 3·51 *candles per foot of gas—the quality being* 16·75 *candles* (3·35 *per foot) by the standard—which was a higher result than that yielded by any other flat-flame burner, though copies of our Slit-Unions, enlarged and improved by us Jan.,* 1879, *were used by our competitor; and higher than the* 80*-candles power Argands.*

NOTE.—The above is the most conclusive answer to the ever-changing and misleading statements which are being made by our competitor, with the object of taking from us the honours we have secured in open contest.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

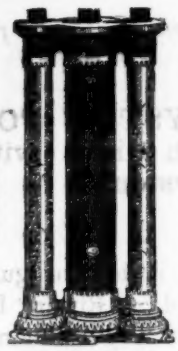
[**The above Lamps have Meters attached.**]

BRAY'S LANTERNS have been adopted by the Vestry of St. George, Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting.

Also more than 50 Towns and Vestries have adopted them, after a similar competition in most cases; and many private users. In all cases they are a pronounced success.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.

June, 1880.



For Heating only.

RITCHIE'S
GAS OR OIL
HEATING AND LIGHTING
STOVES.

Silver Medal awarded in 1878, at Wolverhampton Exhibition.

No Injury to Pictures or Plants.
No Flue.
No Danger from Fire.
No Offensive Smell.
Light and Warmth combined.
Cost less than other Fuel.

Messrs. Ritchie & Co. are prepared to supply these Stoves on the best possible terms to Gas Companies to let out to their Consumers on the hire system.

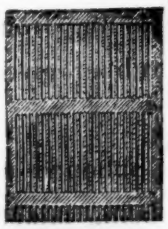
Prices from 50s. to £10 10s.

Full Particulars and Testimonials forwarded on application to

RITCHIE & CO.,
23, ST. SWITHIN'S LANE, LONDON, E.C.

For Light & Heat.

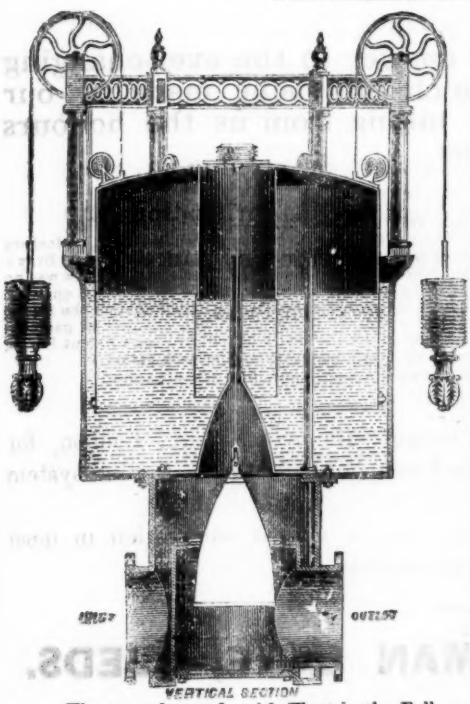
R. DEMPSTER AND SON'S
WOOD SIEVES FOR PURIFIERS,



WITH TAPER OR PARALLEL BARS,
MADE BY SPECIAL MACHINERY.
SCRUBBERS FILLED WITH BOARDS.
On our approved principle, for the extraction of Ammonia.
Prices on application. References to First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, Near HALIFAX.
London Offices: 2, SUFFOLK LANE, CANNON STREET, E.C.

J. & J. BRADDOCK,
GLOBE METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
ROUND STATION-METERS,
ON CAST-IRON STANDS;
SQUARE STATION-METERS,
WITH PLANED JOINTS.

Messrs. Braddock beg to submit to Gas Engineers their
PATENT COMPENSATING GAS GOVERNOR,
Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S
WOOD PURIFIER SIEVES,
Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, Near NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

ESTABLISHED IN 1850.
BENJAMIN CARPENTER,
THE ORIGINAL MANUFACTURER OF THE IMPROVED
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.
PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Shipments Promptly and Carefully Executed.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
Note.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
Recommended by Dr. Richardson.
Manufacturers:
J. F. FARWIG & CO.,
36, QUEEN STREET, CANNON ST., LONDON.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 and 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
Depôt for STOURBRIDGE and NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

Gold Medal Awarded, Paris Exhibition, 1878.

THOMAS TURTON AND SONS,
SHEAF AND SPRING WORKS,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS,
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS,
RATCHET BRACES, LIFTING-JACKS,
ANVILS, VICES,
AND ENGINEERS TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

THE MANN & WALKERS' PATENT SCRUBBER.

Extensive use.

The successful and extensive use of the Mann and Walkers' Patent Scrubbers in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required.

By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained.

The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased.

The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required.

The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works.

There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained.

There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed.

The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee

They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

8, *Finsbury Circus, London, E.C.*

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

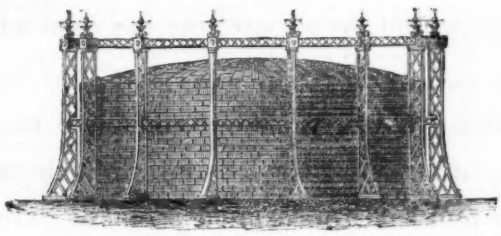
ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS.

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

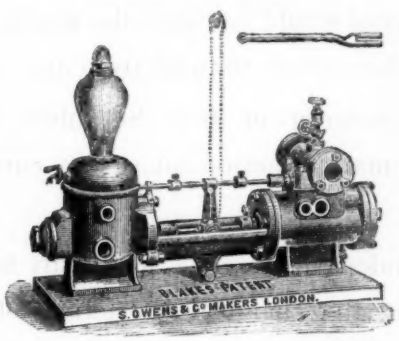
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS

IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

MECHANICAL AND CONSULTING GAS ENGINEER,

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

ALFRED LASS,

Fellow of the Institute of Chartered Accountants,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

30, GRACECHURCH STREET, LONDON.

Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD ST., BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

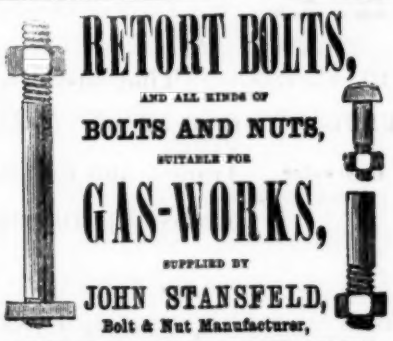
BOX'S PATENT STREET GAS-LAMP

Has the following good qualities:—

1. No putty or other material is required for glazing. Thus there is no hacking out of old putty on removal of the glass, with the *consequent damage* to the lamp frames. 2. No liability to breakage by unequal expansion of the glass caused by changes of temperature. 3. Any inexperienced workman can glaze the lamp in a few minutes. 4. The system of glazing can be applied to any existing lamp at a trifling cost. 5. It is cheap, strong, and durable. 6. The glass can be easily removed so that the frames can be thoroughly painted inside and out.

The lamp may be supplied fitted with clear opal or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing lamps to this system can be supplied at moderate prices and a small charge for royalty. Licences granted on the most reasonable terms. For further particulars apply to the Patentee, W. W. BOX,

Gas-Works, Crayford, Kent.



RETORT BOLTS,

AND ALL KINDS OF

BOLTS AND NUTS,

SUITABLE FOR

GAS-WORKS,

SUPPLIED BY

JOHN STANSFELD,

Bolt & Nut Manufacturer,

ALFRED ST., BOAR LANE, LEEDS.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

TREES BOGHEAD.

SHOTTS BOGHEAD,

And all the first-class Scotch Cannels.

Prices and Analyses on application.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 13,600 *cubic feet of 16·67-candle gas, with 1480 lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: Mr. F. J LEE SMITH, Bromley, KENT.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

V WOOD TROUGHING
For Preserving Service-Pipes.
Price from Three-Farthings per Foot,
In any Lengths.

THOS. PROUD,
Brookfield Works, Icknield St., Birmingham.

STEPHEN HOBBS,

OF

CLARENCE VILLA, RAMSGATE,

CONTRACTOR FOR WELL SINKING

AND

SEWERING WORK GENERALLY,

Begs to inform Engineers and others that he has just completed the extensive and important excavations, amounting to 4000 cubic yards, for the Ramsgate Improvement Commissioners (under the direction of their Engineer, Mr. Valon), whereby a good and abundant supply of water has been obtained, and is now in a position to undertake further work in town or country.

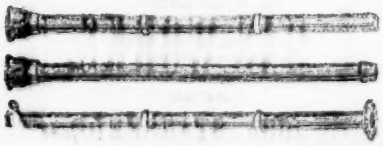
References kindly permitted to be made to MR. WILLIAM A. VALON, C.E., RAMSGATE. Additional testimonials if required.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

30, ST. ENOCH SQUARE, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



'ERY F.O.B., GLASGOW.

Prices on application.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES.

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

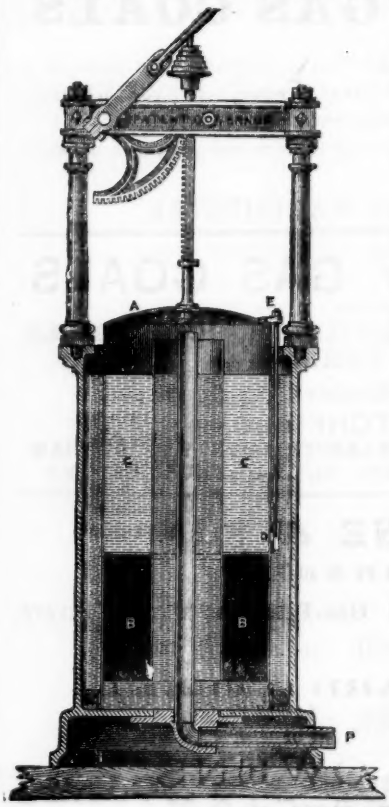
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

Descriptive Circular sent on application.

They are in use at
BECKTON,
HAMPTON WICK,
DUKINFIELD,
HARTLEPOOL,
NEWCASTLE-ON-TYNE,
RAMSGATE,
SUTTON,
and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 428.

PHŒNIX ENGINEERING WORKS,

Holland Street and Bear Gardens, Southwark, S.E.

ALDWARKE MAIN AND CAR HOUSE COLLIERIES,

Near ROTHERHAM.

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD.

PROPRIETORS.

The Aldwarke Main Brights is a first-class gas-making and coking Coal, yielding by analysis 12,600 feet of 19-candle gas per ton, and giving "Weight of illuminating matter in lbs. of sperm, 820·80." It is very free from impurities and foreign matter.

Copies of Analyses made by Gas Companies who have used it will be forwarded and Samples sent on application.

THE LOCHORE & CAPLEDRAE CANNEL COAL COMPANY,

Limited,

Beg to intimate that the development of their Mines is progressing favourably, and that they are now in a position to supply their famous Cannels.

Quotations and full Analyses will be supplied on application addressed to the Company,

LOCHGELLY, FIFESHIRE, N.B.

Abstract of Analyses made by Dr. WALLACE, Gas Analyst for the City of Glasgow.

	Cubic Feet per Ton.		Illuminating Power.		Equivalent of a Ton in Sperm.
Plean Boghead	13,165	....	36·16	....	1632
Brown Capledrae	12,210	....	38·46	....	1610

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise 2000 tons per day of REAL OLD SILKSTONE GAS COAL.

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

CANNEL AND GAS COALS.

THE DUKINFIELD COAL AND CANNEL COMPANY are prepared to deliver, to any Station, their Celebrated GAS COALS, which have a very high reputation for quantity of Gas and Illuminating Power, and make a First-class Coke.

Analyses and terms of delivery may be obtained by communicating with the above Company, at their Offices,

DUKINFIELD, NEAR MANCHESTER.

LONDONDERRY GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

London Agents: Messrs. LAMBERT BROS., 85, GRACECHURCH ST., E.C.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

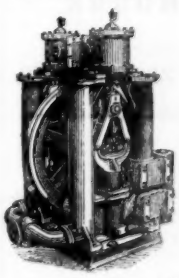
PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. Price, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

Prices are Reduced.

John Cameron's Specialities



ARE HIS

PATENT LEVER

PUNCHING MACHINES

AND HIS

STEAM-PUMPS

FOR

GAS-WORKS,

Feeding Boilers, Steam Fire-Engines, Colliery Deep Lifts, Irrigation, Contractors, and Chemical purposes.

WORKS:

OLDFIELD ROAD, SALFORD, MANCHESTER.

IMPORTANT to GAS COMPANIES.

ENORMOUS SAVING.

JOHN ABBOT & CO., LIMITED,

OF SUFFOLK LANE, LONDON, AND GATESHEAD,

Manufacture and Erect

HYDRAULIC CRANES

For Discharging Coal Barges;

WAGGON HOISTS

For Lifting Coals to Retort-House Stageway;

CAPSTANS

For Moving Trucks about the Yard,

And Apparatus for Lifting PURIFIER COVERS.

Examples to be seen at Beckton, Hull, &c., &c.

NEW PATENT WET GAS-METER,
THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

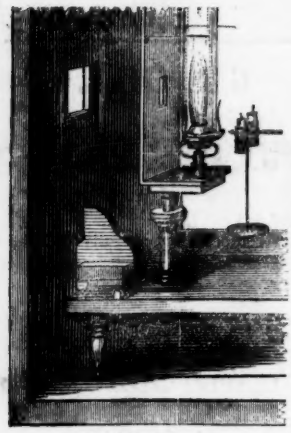
SOLE AGENT FOR SCOTLAND: JAMES KEITH, EDINBURGH AND ARBROATH.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON.



ERRORS IN THE PHOTOMETRIC ESTIMATION OF THE VALUE OF GAS
are AVOIDED by the use of
METHVEN'S
ILLUMINATING POWER STANDARD.

The Illustration shows the application of the METHVEN STANDARD to a LETHEBY PHOTOMETER, with provision for the use of candles in the most approved manner.

All STANDARDS will, in future, be numbered, and be accompanied by a certificate signed by Mr. Methven and by our Manager, Mr. F. W. Hartley.

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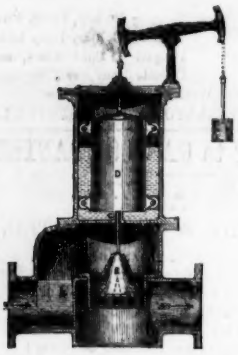

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